FARMERS DIGEST

MAY, 1945

Volume 9 — 25c a Copy

Number 1 — $2.00 a Year

Double-Quick Fertility ..... *Practical Farmer* 1
What It Costs to Raise a Heifer ..... *American Agriculturist* 5
Poults Are Blind ..... *Turkey World* 8
Alfalfa $3 a Ton ..... *The Furrow* 14
Sweet Sudan in the Pasture Program ..... *Seed World* 16
The Montadale—A New Breed ..... *Sheep Breeder* 19
Balance in Plant Nutrition ..... *California Cultivator* 23
Inheritance Must Be Supplemented ..... *Herd Builder* 27
Know Your Phosphates! ..... *Farm Science Reporter* 30
Air Transport for Certain Crops ..... *Better Crops With Plant Food* 32
Liming the Land ..... *Commercial Fertilizer* 35
Modern Trends in Dairy Cattle Nutrition ..... *Brown Swiss Bulletin* 38
Saving Feed and Labor ..... *Michigan Farmer* 42
Raising Geese at Ark Farm ..... *Rural New-Yorker* 44
Thinning of Peaches ..... *Eastern Fruit Grower* 47
"Any Fool Can Grow Tomatoes" ..... *The Southern Planter* 51
Tilt the House, Save More Pigs ..... *M. Glenn Kirkpatrick* 57
Grow Your Own Feeds ..... *Shorthorn World* 59
Steps Take Time ..... *Poultry Tribune* 63
That Rascal, the Crow ..... *Farm Journal & Farmer's Wife* 67
Tractors Cut Corn Costs ..... *Nebraska Farmer* 72
Yam Drying Comes of Age ..... *Farm and Ranch* 74
A Farmer Looks at Alaska ..... *Successful Farming* 77
Save Labor in Corn Growing ..... *Wallace's Farmer & Iowa Homestead* 81
Self-Service for Calves ..... *Successful Farming* 84
For the Farmer's Library 85
Index 87

The Farmer's Digest

EDITORIAL STAFF:

Editor—L. Bush-Brown Assistant Editor—C. Leavitt Dyer
Business Manager—A. E. Heick
Associate Editors—
John A. Andrew, Jr., James Bush-Brown, Ruth Patrick

ADVISORY EDITORIAL STAFF:

William A. Albrecht
Chairman, Department of Soils
University of Missouri

John D. Beck
Professor of Veterinary Medicine
University of Pennsylvania

Hugh H. Bennett
Chief, U. S. Soil Conservation Service

D. B. Johnstone-Wallace
Assistant Professor, Department of Agronomy
Cornell University

H. J. Reed
Dean of the College of Agriculture
Director of the Experiment Station
Purdue University

W. T. Spanton
Chief, Agricultural Education Service
U. S. Office of Education

Howard B. Sprague
New Jersey Agricultural Experiment Station

M. L. Wilson
Director of Extension Work
United States Department of Agriculture

The Farmer's Digest
Published Monthly at Ambler, Pennsylvania
by the Farmer's Digest, Inc.

25c a Copy *1 Year $2.00*
2 Years $3.50 *3 Years $5.00*
Foreign and Canadian Subscriptions $2.50 a Year

Entered as second-class matter at the Post Office at Ambler, Pa., May 5, 1937, under act of March 3, 1879

629545
FEB 2 7 1948

The Farmer's Digest

Volume 9 May, 1945 Number 1

Double-Quick Fertility

Condensed from Practical Farmer

George D. Scarseth
Soil Chemist, Purdue University Agricultural Experiment Station

LAST Summer a friend of mine was looking over some crops that we were growing on "exhausted" lands in Southern Indiana. He came to an exceptionally fine-looking plot of tomatoes. "Nice," he said, "but how much did the fertilizer cost?"

"About $48 an acre," I answered.

Thorough disapproval mapped itself on his face. "Man alive!" he complained. "This land can be bought for less than that."

"Sure, it can," I acknowledged. "But just the same, if I can take $48 into a smokehouse and come out with a profit, watch me run in and out as often as I can."

Here are some of the figures I gave my friend when those tomatoes were picked. When we put the usual kind and amount of fertilizer, costing about $9 an acre, on this land, we got a yield of 8.7 tons. But when we put on the amount and kind of fertilizer that this soil really needed, the yield was 15.4 tons. The $9 worth of fertilizer yielded little profit above costs of operation; the $48 treatment returned a clear profit of $41.50 an acre—and left the land richer.

And I showed my friend plots where we are doing the same thing with corn on land that is so worn out that it produces only 12 bushels an acre without fertilizer. But when given the right dosage of the kind of fertilizer that this soil needs, and when that fertilizer is put in the right place, this land produces 82 bushels of corn per acre. Under the old methods the crop was produced at a loss; under the new it yielded a net profit of $26 an acre.

The tests in which these results were obtained were started about five years ago by Purdue University Experiment Station. The purpose was to find out, if possible, just what it takes to step up the producing power of poor soils in double-quick time, to

Reprinted by permission from the Practical Farmer, Allentown, Penna., February, 1945

bring them back into profitable production in one year.

We knew we were tackling a problem that is critical with many American farmers right now, and one that many more will come up against as they begin to scrape the bottom of the natural stockpile of plant foods in their soils. Throughout the Middle Western States, the Ukraine of America, the evidence of bottlenecks in the fertility of the soil is piling up, year by year. Improved crops, such as hybrid corn, have tended to obscure it. But the "hunger signs" are there for anyone to see; I've seen them all over the Corn Belt. Corn growers are troubled more and more with what they call "dry-weather firing"—when the midrib portion of the green leaf dies. This means the plant is starving for nitrogen. When the outside margin of the leaf turns yellow, starting with the lower leaves, that's a symptom of potash shortage in the soil. Phosphate hunger is easily distinguished on young corn plants by a purplish color of the leaves. Of course we soils men don't go on the visible hunger signs alone; when we want to know what the bottlenecks in plant food are, we make chemical tests of the plant tissues and from these can diagnose the lacks in the diet.

Where the process of soil mining has progressed far enough, the results of bottlenecks in fertility are there for all to see—the sad run-down farms, the sorry spindly crops that can't support a decent standard of living even when prices are high. The maps of Federal and State land-use planning agencies show millions of acres of such land throughout the Corn Belt, with recommendations that these problem areas of non-productive land be "blacked out" of future farming; that they be put back to grass and trees to prevent economic and social loss:

Could these bottlenecks be broken? Could productivity be restored? To try to get the answer to these questions, we located many of our experiments in Southern Indiana, on thin silt loams that had little of the juice of life left in them after years of taking out plant foods and returning little or nothing.

The first bottleneck we encountered in the nutrition of corn was lack of nitrogen in the mid-Summer season when most needed by the plants. To side-dress a nitrogen carrier, as is done in the Gulf Coast States for corn and cotton, did not work, because Summer rains in Southern Indiana frequently aren't heavy enough to move the nitrates into the ground and down to the roots. So we tried a new method of applying fertilizer, placing it in a band on the plow sole when

turning the land. This puts the fertilizer right down where the roots are going to operate, five to eight inches deep. A special attachment to mount on a plow was developed at Purdue for feeding the fertilizer down behind the plowshare onto the plow sole as the land is plowed. But it was discovered that nitrogen in the form of nitrates would not stay put—it would dissolve in the soil moisture and move upward toward the dry surface, out of reach of the roots. That problem was solved by using nitrogen in the form of ammonium compounds, such as ammonium sulphate, cyanamid, or urea; these forms of nitrogen are embraced by the soil particles and held just firmly enough to keep from moving with the soil moisture, but not so firmly that the plant roots can't take them up.

Our next job was to diagnose the amount of plant food needed by the kind of crop we wanted to produce. The usual practice in this area was to depend entirely on 100 pounds of "starter" fertilizer, analyzing 2 per cent nitrogen, 12 per cent phosphate and 12 per cent potash. It had no more of a scientific basis than sulphur and molasses in Spring as a blood thinner. Its widespread use on low-fertility soils can be attributed to tradition, or to the fact that it does increase yields—a little.

For example, in 1939 we ran a test on a Vigo silt loam near Cloverdale, Indiana. On one plot we put the usual fertilizer—100 pounds per acre of 2-12-12 in the row—and it produced 26 bushels an acre. On another plot we put the amount of plant nutrients that we figured it would take to make a real crop; 400 pounds of ammonium sulphate plowed under, and 600 pounds of 3-12-12 added in the row—and this yielded 82 bushels an acre. As a further check on the effect of nitrogen, we ran another plot in which 600 pounds of 3-12-12 was added in the row, but without any ammonium sulphate plowed under. It yielded only 31 bushels an acre.

This heavy use of fertiilzer paid its own way. The total cost of making the 26 bushels of corn was about $19, and the total value of the corn produced (at 75 cents a bushel—the level used in all the experiments) was $19.50. There was little profit in this; besides, the soil was made even poorer by the small but stimulating amount of fertilizer; it was just a shot in the arm. There was no profit in the 31-bushel yield either, as the extra 500 pounds of fertilizer cost $8, but added only 5 bushels of yield. But the 82-bushel yield made a better showing. The gross value of the corn was $61.50 per acre. The fertilizer cost $18, the over-

head, rent and labor cost $17.50. Thus, total costs were $35.50, leaving a net profit of $26.

That isn't all, for in addition to the immediate profit the soil was considerably richer for succeeding crops, having a residual carry-over of plant food and organic matter from the extra stalks.

These results were obtained in a year when rainfall was plentiful, and the yields were not handicapped on either poorly or well fertilized soils. It was in 1940 and 1941, when rainfall was short, that we learned there is considerable advantage in placing the bulk of the phosphate and potash fertilizers, as well as the ammonium nitrogen carriers, deep in the soil on the plow sole.

Another common fertilizer mixture in the Middle West, and one that works satisfactorily on soils well supplied with nitrogen, is a phosphate-potash mixture, without nitrogen—0-12-12. This mixture was tried on an exhausted soil near Reelsville, Ind., but yields didn't rise above the 12 bushels an acre that were produced with no fertilizer. Nitrogen was the bottleneck. When the mixture was balanced with nitrogen, yields rose sharply. When a 10-10-10 mixture was broadcast on the surface of the ground at 800 pounds an acre immediately plowed under, the land yielded 57 bushels an acre. But when this 800 pounds of 10-10-10 was placed on a band on the plow sole, the yield was 12 bushels higher—69 bushels. We believe that this 12-bushels-an-acre difference between the two methods is due to the fact that a plow doesn't turn the soil over completely, and the fertilizer was scattered from the surface downward—instead of being concentrated in the right place.

The immense possibilities of breaking the bottlenecks of plant hunger and of getting the productivity of poor soils up to a high level in one jump haven't been thoroughly explored, but should be pretty obvious, especially today when food is just as important as ammunition. All of our best land is producing to its limit. Our poor lands are loafing because—like an assembly line where one vital part is missing—they are lacking in one or more of the plant foods. Right now, we can't hope to get the amounts of fertilizer needed to bring them into full production, but still, if food should become more important than ammunition, those poorer lands offer a great and immediately available potential production capacity.

Is any land "poor" if, through the right amount of the right kind of fertilizer, put in the right place, it can be made to produce large and profitable yields?

What It Costs to Raise a Heifer

Condensed from American Agriculturist

C. L. Dickinson

THE NEXT time you go into the cow stable, just for the fun of it compare the cost of the cows that you have raised with the ones that you have bought from someone else. I've done that on a number of occasions, and I'm always amazed at the amount of money that gets tied up in a heifer before she begins to pay off.

Let's take a look at this business of raising dairy heifers and see if we can work out a formula to determine just what it does cost to bring a heifer from the baby stage up to a two-year-old, ready to freshen.

Let's disregard the value of the calf, which will vary tremendously depending upon whether she is pure-bred with a string of records or just an ordinary calf out of an ordinary cow. It takes just as much feed to raise a heifer and it takes just as much time, and it takes just as much barn room and pasture—whether she's descended from the first importations of purebreds into this country or whether she's just an ordinary scrub without any family background.

In these days of high milk prices, the cheapest way to raise a calf is to feed it a minimum amount of whole milk and change it over to a diet of grain and hay as quickly as possible. There are a good many formulas for Calf Starter which have been used successfully in raising calves on a minimum amount of whole milk. Under this system it takes about 350 pounds of whole milk, around 300 pounds of Calf Starter and 400 pounds of hay to raise a calf to about 16 weeks of age. From this age on to two years a diet of top quality hay, good pasture and a low protein grain ration will provide all the nutrients necessary for good growth.

The cost of feed at present prices required to raise the calf up to 16 weeks would be:

350 lbs. whole milk @ $4 per cwt.	$14.00
300 lbs. Calf Starter @ $4 per cwt.	12.00
400 lbs. hay @ $20 per ton	4.00
Total feed cost to 16 weeks	**$30.00**

The average consumption of hay from 16 weeks to a year will be about 10 pounds per day. It will take at least three pounds a day of fitting ration or a simple

Reprinted by permission from American Agriculturist, Ithaca, New York, Mar. 3, 1945

low protein grain ration to keep the heifers growing during this period.

It is advisable to turn heifers into pasture during the summertime, if the pasture is of excellent quality and if the heifers have plenty of fresh water and feed. However, the amount of feed that heifers get from grass during the first year of growth should not be counted upon too heavily, and in figuring the first year cost of raising heifers, I believe that it is sound practice to include hay and grain during the pasture season at the same rate as these feeds are fed during the winter feeding season. It will take 10 pounds of hay a day and 3 pounds of grain a day for 36 weeks to do the job. Therefore, the cost of feed used in raising a heifer from 16 weeks to 52 weeks of age will be:

2520 lbs. hay @ $20 per ton	$25.20
756 lbs. grain @ $.03 per lb.	22.68
Total feed cost from 16-52 weeks	**$47.88**
Plus feed cost to 16 weeks	**$30.00**
Total feed cost of yearling	**$77.88**

Take a look at this figure again. It does not include the original value or cost of the calf. It doesn't include any charge for labor, nor does it include any charge for rent of buildings, depreciation on equipment, interest on investment, etc. What we're talking about is just the actual cost of the feed, based on present values, that the calf should eat in order to get maximum growth during its first 12 months.

Now, let's see what it costs to bring this yearling up to the time it is ready to freshen.

During the second year the heifers will make much better use of pasture, and while they will and should eat some hay while they're on pasture, especially during the hot, dry months of July and August, a considerable saving in feed can be made when the pasture is good.

During the second year the the yearlings will eat an average of about 14 pounds of hay a day for 220 days and around 10 pounds of hay a day for at least 60 days during the pasture season unless the pasture is exceptionally good throughout the entire growing season.

During the barn feeding season they will also eat about three pounds of grain a day for 220 days.

The feed cost of raising a heifer during the second year is as follows:

3680 lbs. hay @ $20 per ton	$36.80
660 lbs. grain @ $.03 per lb.	19.80
Total feed cost second year	**$56.60**

Now, let's put the feed costs of the first and second years together.

Cost from baby to 16 weeks	$30.00
Cost from 16 weeks to one year	47.88
Cost during second year	56.60
Total feed costs to 24 months	**$184.48**

If the heifer is bred to freshen at 27 months of age, she will probably eat 360 pounds of grain and about 1200 pounds of hay between the time she is two years old and the time she freshens.

360 lbs. grain @ $.03 per lb.	$10.80
1200 lbs. hay @ $20 per ton	12.00
	$22.80
Feed cost from birth to two years	134.48
Total feed cost raising heifer	**$157.28**

About 55% of this cost comes from the hay. It may be argued that the figures I have presented, particularly for hay are too high. Certainly the price ($20.00) per ton) is much higher than is normally figured for hay. However, if this hay is not fed to heifers this year it certainly could be sold at $20.00 per ton and the money used to buy heifers raised by someone else.

If ensilage is fed to replace part of the hay, the roughage costs can probably be reduced somewhat. Here again, the cost probably runs higher than the figure usually used. Assuming the cost of ensilage is $6.00 per ton, it takes three tons of ensilage to replace one ton of hay, so that the total cost is only slightly reduced.

Every time I study my own costs on raising heifers, I become more convinced that it only pays to raise the good ones. Who wants to get from $150 to $200 tied up in a first calf heifer unless she is the kind that will pay off her mortgage while she's still alive?

Fruit Thinner

A new, three-purpose, oil-wax emulsion, orchard spray has been developed at Michigan State College. It serves to thin blossoms on fruit trees without hand labor, reduces leaf water loss to maintain production thru dry periods, and provides a spreader and sticker for ordinary insecticides and fungicides. Further trials will be necessary to develop proper application methods. Basis of the formula is paraffin wax and bentonite.

—*Successful Farming*

Poults Are Blind

Condensed from Turkey World

Prof. J. S. Carver

Washington State College

POULTS actually are almost blind when hatched! It is several days before they attain full vision.

Turkey growers who are fully conscious of this fact and take every precaution to assist poults in seeing their feed and water and learning to eat and drink as soon as placed in the brooder, can reduce their mortality to a minimum.

For several years we have been making observations at the Washington Agricultural Experiment Station to determine why it is frequently so difficult to get newly hatched poults to eat. Several years ago in one of our first nutrition experiments with young poults, we found that half of the poults in each lot had gained very little weight at the end of a week's time; in fact, some of the poults weighed less than they did when they were put in the brooder at 24 hours of age. As a result of this, we had a considerable amount of mortality and a very uneven growth in all lots of poults.

Anyone who has raised turkeys has had considerable difficulty in teaching the young poults to eat and drink. These poor results induced us to make a careful study of some of the causes which might influence poults to learn to eat. One of the first tests we made with day-old poults was to take a piece of green, leafy alfalfa with about a ten-inch stem and lower it from a height of about a foot to the ground, observing from the different heights where the poults seemed to evidence the greatest interest in this attractive bright-colored green feed. Much to our surprise, we found that poults would peck very rapidly and aggressively at the green feed which was about level with heads held in normal position. But when the green feed was lowered towards the floor, they lost their interest and apparently did not see it clearly. When the alfalfa was raised above the height, again they showed lack of interest. It would appear that for the first few days, at least, poults could see things better if they were

Reprinted by permission from the Turkey World, Mt. Morris, Ill., March, 1945

raised slightly from the floor, and that their eyes did not focus particularly well on things fed to them on the floor, unless they were very bright and attractive in color.

It is often necessary in making our plans for raising turkeys to get back to nature. In natural life in the wilds the mother hen turkey feeds the little ones by holding insects, seeds, etc., at their eye level and helps them to find the food.

As a result of these observations, for several years we have advised turkey growers to pay special attention to teach the turkeys to eat just as soon as they have received them from the hatchery. Twenty-four hours of age is an excellent age to teach poults how to eat. In fact, they seem to do a little better at this early age than they do when over 48 years of age. We take each poult out of the shipping box and dip its beak into water and then into the mash. Many commercial turkey growers think that this is a waste of time, but we feel that this may help often times, particularly in teaching the turkeys to find the water. The hoppers should be raised slightly from the floor and distributed on a radial basis underneath and around the hover, and raised in height either by the use of blocks or by using some of the new type hoppers which are adjustable for height, so that the turkeys can see the feed easily. Plenty of hopper space should be provided, and the mash, pellets, or other food used should be leveled to the top of the hopper.

We found last year that it helped to get these young poults to eat if we used half-inch cut succulent alfalfa sprinkled on the top of the mash. They were attracted to the green feed which we fed several times a day in small quantities, and learned to eat the mash quickly following this method.

We also have started to do some experimental work on the use of colored feed. It was our observation in the preliminary work which we did last year that the poults preferred a green dyed feed over the ordinary colored mash. We used the green dyed mash as a supplementary feed to be fed on the top of the regular mash and fed this several times a day in small amounts on top of the regular mash. We have not finished checking these results, but already we do know from our observations that the green colored feed certainly does attract the young poults to eat more readily of the mash. In fact, in the results secured in our experiments last year where the poults were fed these attraction feeds, the mortality at four weeks was only two percent in the many different lots which we fed.

Editor's Note: (Since many will request how to dye feed for starting poults, we asked Prof. Carver to provide this information. These experiments were conducted merely to show the reaction of poults to color of feed and it may not be practical for turkey growers to dye feed for starting poults.

(Green liquid food color was used in the Washington experiments. Using the dye in water was not satisfactory because of the difficulty encountered with lumping. Although no entirely satisfactory solvent has been found as yet, best results were obtained with 95 percent alcohol. The feed, of course, was allowed to dry before using).

Adequate light is especially important for day-old poults. Since they have poor sight, plenty of light will help them to find the feed more readily. Some recommend using a 100-watt bulb at first and placing it where it will shine directly on the brooding circle and poults will have no difficulty in finding their way around.

We also have observed that the poults seemed to consume more water and to learn to drink much more quickly when they were started with water in the glass watering devices. We used the two-quart and four-quart sizes and found that the sparkle of the water seemed to attract the turkeys to these drinking fountains, whereas in the past we had used metal fountains which we found very often difficult to induce some of the turkeys to come to drink.

Where the poults are started in batteries, we have used a simple device to induce them to drink which has proved quite effective. We take a small bright metal clip such as a paper clip, and place four or five of them on a string stretched over the center of the drinking pan. These sparkle and the birds peck at them, at the same time finding that there is water in the pan. Before we used these, we found it very difficult to get the poults to drink from the water troughs in batteries.

All this is along the same line as many previous recommendations—placing glass marbles in the feed troughs, sprinkling rolled oats over the feed and other such things. We were particularly interested in one recommendation in the March issue last year. This suggested punching many tiny holes in a strip of sheet metal. By hanging this device above the feed hopper and placing a strong enclosed light above it, pin points of light would be thrown on the feed, which attracted the poults and caused them to pick at the feed.

While this problem of teaching the young poults to eat is very important, another problem which we feel cannot be empha-

sized too much is that of proper brooding conditions for the first week.

Many turkey growers have come to the conclusion that they can do a better job, particularly the first week of brooding, if they use a brooder which does not have a curtain, so that they have an opportunity to observe the poults under the hover at all times. It is our observation that during the first week of brooding, it is very important to see that the turkeys have comfortable brooding temperatures at all times both day and night.

The number of poults placed under the hover should be adjusted to the size of the hover and to the size of the room. It certainly does not pay to crowd the brooder at any time. Many growers "get by" for years by placing 300 or 400 in each pen. However, the day of reckoning always comes. Do not tempt fate and invite trouble. Particular attention should be paid to the comfort of the poults for the first three days and to check frequently at night to see that the poults are evenly distributed both under and around the hover and not allowed to bunch or crowd at any time.

The importance of having a sufficient number of feeders and waterers should be given careful consideration. For every 100 poults, you should allow at least one linear foot of feed frontage (one side) each five poults. Thus, the amount of hopper space should be computed for your brooder depending upon the number of poults you are placing under the hover. You also should provide each 100 to 150 poults with at least two one-gallon waterers to start with. There is nothing that you can do that will help more in getting your poults off to a good start than to have plenty of hopper space for your mash or pellets and to have plenty of drinking space with ideal temperature for brooding.

Be sure to provide a warm hover and a cool room without drafts. This means that your fresh air intakes must be so arranged that the cool air intakes, particularly in early brooding season, do not cause direct drafts on your poults under the hover causing them to move to one side and bunch. A well-placed hover guard will assist greatly in preventing drafts and insure an even distribution of your poults under the hover.

From our observation, from 150 to 200 poults are enough to brood in any house. This is true, particularly if the brooder house is going to be used to house these first growing poults up to eight or ten weeks of age. It is interesting to note that the little day-old poults weigh only about 0.13 pound. At eight weeks the same

poult has increased to the weight of 3.7 pounds, or about 28 times the original weight. This would indicate that if you want to raise a higher percentage of poults in 1945 and get at the same time a more uniform growth, you should give your poults plenty of room and do not crowd.

Keep the litter dry, particularly under the hover and around the drinking fountains. Many kinds of litters have been used satisfactorily with equally good results. An excellent practice to follow is to rake over the litter around the hover every day to keep it aerated and stirred up. If it should become soiled and damp, be sure to remove it and replace it with dry clean litter.

Often the litter becomes damp because one is careless in filling the drinking fountains. If the litter becomes wet because of spilling water, replace it immediately with dry litter. After the poults are a week old, the water fountains can be placed on slatted or half-inch mesh wire screen frames built on 1 x 4 frames. This will keep the litter and droppings out of the water and keep the litter dry. Turkey growers also have found it very desirable at ten days of age to place their hoppers on wire frames which assist in keeping the mash or pellets clean and free from contamination.

Inasmuch as poults grow very rapidly and their feed consumption increases with their rapid growth, it becomes necessary to increase frequently the amount of hopper and drinking space in the pen so that at any time you observe the poults eating from the hoppers, there will be plenty of room for all of them to eat at one time. Even at a week or ten days, you may find it necessary to add a hopper or two for a rapid-growing bunch of poults. Even growth cannot be maintained unless adequate hopper space is provided. Your poults should be your guide in this respect.

Not only do they require more hopper and drinking fountain space, but they also must have more floor space. The easiest and cheapest way to provide increased floor space is to construct a sunporch equivalent in floor area to that of the brooder house. The advantage, other than supplying more floor space for the birds, is that it gives you increased hopper space and drinking space, as hoppers usually are arranged on all sides of the sunporch. It also helps in preventing feather picking and in developing more normal and rapid feathering. This may be attributed to greater activity, the cooler temperatures, and possibly to some rays of the sun. The presence of the ultraviolet and infrared rays of the sun does much to keep the

turkeys in a healthy and vigorous condition.

One of the most critical periods in the brooding of poults is the period between the time they are weaned from the brooder to the development of a roosting habit. At the age of four or five weeks, under ordinary conditions, poults are ready to roost. The temperatures have been steadily reduced until the brooder temperature is about the same as the room temperature. The principal difficulty encountered at the time when the poults are weaned from the heat when the house gets dark in the evening, is that they like to pile in the corners. An inclined roost with 1 by 3's spaced about eight to ten inches apart, with wire underneath at the rear or the sides, makes a very simple but effective roosting roost. This should start practically at floor level in front and extend to a height of two or three feet at the rear of the house. In order to attract the turkey poults to the roost, a red-colored 7½ to 15-watt bulb should be hung over the center of the roost and turned on in the early evening before it gets dark. This will supply them with enough dim light. With this system which is used satisfactorily by quite a large number of successful commercial turkey growers, the difficulty of piling in the brooder house practically is eliminated. The poults should be retained in the brooder house until they are eight or ten weeks of age, when they are then ready to move on a free range for their growing period.

Fowl Paralysis

Brooding baby chicks more than 100 feet from adult birds during the first two weeks has reduced greatly their future death rate from leukosis (one form commonly known as fowl paralysis) in experiments conducted by the poultry department at Cornell University. In seven years of testing, the death loss from this disease while between 160 and 500 days of age was consistently lower among pullets which, as day-old chicks, had been started 110 feet from adult birds than among those, of equal resistance, which had been brooded for two weeks in a house only 40 feet away. These results offer a practical way to reduce losses from this dread disease.

—*Successful Farming*

Alfalfa $3 a Ton

Condensed from The Furrow

Lester H. Hartwig

Most farmers would jump at the chance to buy dark green, leafy alfalfa hay at $3 a ton, and they would all want to know where hay is available at that price. The answer is—right on the farms of those willing to apply superphosphate to their fields.

Dr. C. O. Rost and his associates in the soils department of the University of Minnesota found that on an average the application of 200 pounds of 20 per cent superphosphate, or 100 pounds of 43 per cent superphosphate, valued at slightly less than $3, increased the yield of alfalfa hay by just a shade better than a ton per acre. Their comparative yield trials were conducted for several years on several hundred farms representing important agricultural sections in the western half of the state.

Not only was the yield of alfalfa hay increased by more than a ton per acre, but quality generally showed marked improvement. In some instances the height of the alfalfa was increased by more than 10 inches. It was common for alfalfa grown on phosphated soil to show increased leafiness over hay from check plots. Darker green coloring was evident on better than 75 per cent of the cuttings.

Of course, in addition to paying about $3 per acre for the superphosphate required to coax that extra ton of high-grade alfalfa from the soil, there is the problem of applying fertilizer properly at the right time.

Actually, it can hardly be referred to as a problem. For after all, application of commercial fertilizer is comparatively simple. The most satisfactory method known is by means of a combination fertilizer and grain drill. This machine will distribute the fertilizer evenly and uniformly into the proper place in the soil. An endgate or trailer-type spreader or the "low-down" fertilizer and lime sower are also satisfactory. Others have found endgate, broadcast seeders, or grasshopper bait spreaders entirely suited to the spreading of phosphate fertilizers.

Don't give up hope if you haven't any of the spreaders already mentioned. When no other

Reprinted by permission from The Furrow, Moline, Illinois, Oct.-Nov., 1944

means for spreading phosphate is available, it may be spread over each load of manure, the amount per load being determined by dividing the rate per acre of phosphate by the number of loads of manure per acre.

If it is your choice to use the broadcast method of application, it is important that you remember this admonition from Doctor Rost: Care must always be exercised to disk or otherwise work the superphosphate thoroughly into the soil.

And here's another precaution: Whatever type of machine you choose for spreading the fertilizer, keep it properly oiled and adjusted. Cleaning the machine thoroughly after the work is completed prevents rusting and breakage and leaves it in top-notch condition for the next time it is used. You'll find an old tire pump or a stiff brush helpful in cleaning. Painting to prevent rusting is a final precaution that will guarantee having your spreader in readiness for the next use.

If you are after maximum yields from your farm, the application of superphosphate isn't something that can be done one year and then forgotten. It must be made a definite part of the rotation program. Application of commercial fertilizer is the positive means which must be taken to halt the gradual, but steady, decline of natural soil fertility.

Many farmers have the mistaken idea that the fertility of their soils is inexhaustible. Actually, without realizing it, they are removing soil fertility at an alarming rate. This mining of soil wealth not only jeopardizes their own welfare, but also threatens social and economic deterioration of the entire nation.

The experience of a dentist in a small Minnesota town dramatically illustrates this point. He became alarmed at the large number of decayed teeth in youngsters of the community. Their teeth were not nearly so sound as those of their parents as children before them. Investigation revealed that the soils of that community had been depleted of phosphorus. This deficiency was responsible for the poor teeth in mouths of children raised on foods grown locally.

If this sounds startling, consider the facts: Every time you sell a bushel of corn or wheat, or send a hog or can of milk to market, you sell a part of the fertility of your soil. A conservative estimate places the value of the soil assets removed with each crop at $8.15 per acre.

However, this removal may be compensated by the return of soil nutrients in the form of manure and commercial fertilizers, by proper crop rotations, use of legumes and other soil maintenance practices.

It is of course fortunate that the depletion of our soils is gradual, and that signs of its approach are evident long before the damage is irreparable. Doctor Rost lists these signs as slowly declining yields, depletion of the organic matter of the soil, increasing difficulty in obtaining stands of legumes, soil erosion, a poor physical condition of the soil, and the response to lime and commercial fertilizers.

If you are able to read these signs, and then make a determined effort to adopt remedial measures, you will be well on the road to more profitable yields—and you may be able to grow some of that good hay for $3 a ton.

Sweet Sudan in the Pasture Program

Condensed from Seed World

Harold Severson

DESTINED for an important place in the pasture programs of both the Southwest and Southeast is Sweet Sudan grass, a cross of Sudan grass with Leoti sorgo. Developed in Texas by R. E. Karper, of Lubbock, Agronomist in Charge of Sorghum Investigations for the Texas Experiment Station, and J. R. Quinby, Superintendent of the sub-station at Chillicothe, the new grass has a number of valuable characteristics including sweet and juicy stalks, disease resistance, non-shattering seed and a distinctive sienna glume color which enables seedsman and farmer alike to easily distinguish its seed from that of Johnson grass or other sorghum mixtures.

The quantity of seed is quite limited. According to a recent report by Mr. Karper, only several hundred acres were planted this year. However, the seed of this crop will permit the planting of close to fifty or sixty thousand acres of sweet sudan next year.

One of the seed increase plots planted this past year was that on the Middle Tennessee Experiment Station near Columbia, Tennessee. Only a half-acre of sweet sudan was planted and a faulty grain drill was responsible for a poor job of planting. That factor, together with the worst drought in the state's history, accounted for only a partial stand of the grass. However, L. R. Neel, superintendent of the station, has enough seed to permit grazing

Reprinted by permission from the Seed World, Chicago, Ill., January 5, 1945

and feeding experiments next summer.

As far as Dr. Neel knew, the test plot at the Tennessee station was the only one planted east of the Mississippi river this season. However, the many advantages of the new sudan grass will find an increasing number of farmers planting it during the next few years.

Seed of Sweet Sudan grass has been distributed to approximately five hundred farmers and agricultural workers in Texas and many other states and in foreign countries. Mr. Karper writes that small stocks of seed were distributed in 1943 and a wider distribution made again the past spring. It is expected that from five to six carloads of certified seed will be produced this year and that within a few years most of the old common sudan will be replaced by the new variety.

The luxuriant growth and sweetness of Sweet Sudan will make it a very attractive proposition for beef cattle producers and dairymen alike. The common variety of sudan grass came into this country about 35 years ago, being introduced into this country from the Sudan country of Africa. Today it has become one of the Southwest's favorite crops because of its value as both a pasture and hay crop. Furthermore, 40 to 50 million pounds of seed are produced annually as a cash crop for the farmers in the Plains area of Texas and New Mexico.

Unfortunately, old Sudan grass has its drawbacks. It is very susceptible to foliage disease along the Gulf Coast. Another drawback is the striking resemblance of its seed to that of Johnson grass seed. This makes it impossible to detect the presence of Johnson grass seed when mixed with Sudan grass seed. Consequently, farmers who are not cursed with Johnson grass seed steer shy of Sudan because of the danger of polluting their fields with this pest.

Dr. Karper and Mr. Quinby became interested in the possibilities of an improved variety of Sudan grass. Consequently, several years ago they began experimenting with crosses of sudan grass and sorghums, since it crosses readily with members of the sorghum family. Their plant breeding project consisted of compounding an entirely different variety by transferring the characters of sweet and juicy stem, non-shattering seed, disease resistance and the distinctive sienna glume color from the Leoti sweet sorghum while retaining the grassy characteristics of Sudan grass. This required a long period of crossing, backcrossing and selection in the greenhouse and in the field over a period of several years. Today they have

a product that is more leafy and produces larger yields of forage and seed and is more palatable to livestock than common Sudan grass. It remains green and grows a month or more longer than common Sudan (under most circumstances) because it is later maturing and because it is not so susceptible to plant diseases which materially reduce the quality of the forage and stop growth and development of the plant. These diseases are bacterial leaf spots (which affect the foliage) and charcoal rot, which attacks the stem and roots of the plant. These are important factors in determining the quality and amount of forage produced. Furthermore, it is also more resistant to chinch bugs than the older variety.

There is also another advantage of the Sweet Sudan over its parent. Sudan grass seed is an important cash crop. Unfortunately, a single adverse climatic condition such as an untimely frost or cool fall harvesting period with high winds often causes the loss of millions of pounds of seed . . . the result of the seed heads shattering. Fortunately, the new variety does not shatter as easily as Common Sudan and this will reduce the losses to growers when the new variety attains its destined popularity.

Carloads of Sudan grass seed have often been rejected by purchasers because of the presence of Johnson grass seed in small amounts. As the discoverers of the new variety pointed out in a progress report, the contamination with Johnson grass takes place in the field where the seed is grown. A very small percentage of contamination is not evident to the local buyer or sometimes even to the farmer, and only a trained seed analyst is willing to say definitely whether a Sudan grass is free from Johnson grass. When Sweet Sudan comes into general use, even an amateur will be able to detect the presence of Johnson grass in a sample because of the difference in color between it and Sweet Sudan. The latter is a reddish brown in color, whereas the Johnson grass has glumes that are black, brownish-black or blackish-straw in color, and therefore stands out like a red flag. Furthermore, Sweet Sudan's distinctive seed color enables seedsmen to distinguish it from ordinary Sudan grass.

Seedsmen will be able to get only tiny lots of seed this year—at best, but in the space of two or three years they will have all the seed they can sell. Within two or three years, results of pasturage tests with common and Sweet varieties of Sudan grass also will be available.

The Montadale — A New Breed

Condensed from Sheep Breeder

SHEEP have always been in the march of progress of American Industries. The sheep men of America, along with the United States Department of Agriculture, have spent thousands of dollars and many years in experimenting to improve the sheep—the animal "most important" to man's existence.

The best way to measure the progress made with sheep is to look at the "Argali" or original mountain goat from which the sheep is a descendant and compare the fine quality of wool and mutton of our present-day sheep. To say further progress could not be made would be folly and many experiments are being conducted every year and good results are being recorded.

Mr. E. H. Mattingly, of St. Louis, Missouri, who has spent thirty-two years buying sheep on the markets for many packers, was well qualified to carry on in the experimental field. Every year he finds many thousands of lambs on the markets that are too light for the packers and surely too light to be profitable for the farmer, as well as many half fat lambs and actual medium and poor quality lambs that should have been held for the fall and winter market. It is agreed it is most profitable to sell lambs on the June or July market provided sufficient weight and finish is there and our farmers have been too easily satisfied with a 75 lb. lamb. By having an 85 lb. lamb ready to sell by July 1st, more profit is made by the farmer, and a better market will be available as this weight will attract the competition from the order buyers for Eastern shipment; then, too, the usual loss of weight during hot weather is avoided. The ewes will also be in much better condition for fall breeding. Mr. Mattingly, who has always had plenty of orders for choice lambs, has spent much effort to improve the native lamb which would make the farmer a bigger profit and help the packers as well.

Mr. Clemens C. Vehige, owner of the Blue Grass Valley Farm at Foristell, Missouri, joined Mr. Mattingly in his effort to standardize a new breed of sheep. A high "Standard" was set and they knew if this "Standard" could be reached, it would be worth many extra dollars to the farmers. The "Standard" agreed on was:

1. The ewes must clip an average of 14 pounds of wool per flock.

Reprinted by permission from the Sheep Breeder, Chicago, Illinois, March, 1945

All yearling ewes must average 125 lbs. without grain.

2. The lambs must weigh an average of 85 pounds in 4½ months without grain and be of choice quality.
3. The new breed must be whiteface, suitable for farm or ranch.
4. The ewes must be good milkers and a sturdy, healthy sheep.
5. The wool must be of top quality with a heavy clip.
6. The breed must have a small head and an open face.

In 1937 the first sheep were purchased and after four years of cross-breeding, they are proud to report this standard was not only met, but was surpassed with the Montadale — The Sheep of the Future.

It would be hard to estimate in dollars what this "Standard" means to the farmers. It just about doubles the average wool clip of some of our popular native breeds and will add two to four pounds to some of the heavier shearing breeds. This "Standard" will add an average of seven to ten pounds more weight per lamb at 4½ months with the same care. These are just a few of the reasons why the Montadale ram lambs are contracted for breeding a year in advance. The results of cross-breeding these rams on native sheep have created a tremendous demand which could not be supplied. For the past three years every ram lamb has been sold for breeding purposes, and not a single one of these ram lambs was kept by the producer long enough to become a yearling. In August, when delivery time came these rams were weighing an average of 110 pounds, which was large enough for breeding.

To create the Montadale breed, the Columbia ram was crossed with the Cheviot ewe. After four years of careful grading of offsprings, a true type which met the "Standard" was developed and named Montadale, which means a heavy shearing sheep from Montana. The finest blood lines of both breeds were purchased, all purebred stock, and no expense spared to get the selection of the highest quality to be found. The reasons for the selection of these breeds are many. First, the Columbia is a big, sturdy, heavy shearing range sheep, has a white face and a small head, well wooled body and legs and an open face and has proven to be one of the most desirable for range purposes. The Montadale inherits that sturdy body with plenty of weight.

The Cheviot holds the record for being the highest dressing lamb of any breed. They differ from other white face breeds in that they are world famous for their milking qualities, which made them the perfect sheep to

cross with the Columbia. The Cheviot is strictly a "mutton" type sheep. They are hardy and less susceptible to most sheep diseases. The Cheviot ewes were chosen to use in producing the Montadale because of the good supply of milk these ewes give for the young lamb and this very important feature has made it possible to exceed the "weight of lamb" set in the standard. The Montadale lambs are born fat and never lose it under normal care. The Montadale lambs develop and grow fast, which makes them very desirable for crossing on other breeds for market lambs. The Montadale ram can be profitably crossed on any breed, for the yearlings of the smallest type can lamb without difficulty. The small head of the Montadale makes this possible.

The Montadale is considered very prolific—twins are common and triplets are not unusual and there is usually ample milk for them. This is one reason a greater number lambs per ewe will be marketed with Montadales. They possess strong prepotency qualities, the fine mutton quality of the Cheviot predominates in appearance, while the size and the wool from the Columbia show up best on the scales. The wool from the Montadale grades and sells equal to the Australian wool, which is at premium prices and few, if any, American sheep can so qualify. To say "The 'Standdard' set for the Montadale has not only been reached, but surpassed," is proven by taking the record of the wool clip and lambs the seventh season as an example.

The Montadale ewes averaged 14½ pounds per sheep—the yearling ewes clipped 16 pounds and weighed an average of 135 pounds. No grain was fed at any time, only good pasture. The wool sold at 1c per pound premium. The ram lambs were all sold for breeding purposes at an average price of $40.00 per head and were delivered August 15th at an average weight of 110 pounds each.

The blood line of the Montadale developed by Mr. Vehige and Mr. Mattingly is named the Mono-scot line—the Cheviot ewes are imported from Scotland herds and the Columbia rams from the finest Montana herd of Columbias. In order to produce the finest blood lines, three different lines of Cheviot ewes were purchased and two different lines of Columbia rams used. As feeding lambs, there is little doubt about their ability to gain more pounds and grow wool faster than any sheep. A distinct advantage is enjoyed by those feeders who choose to clip their lambs, because a Number One pelt will be found on the Montadale as quickly or more quickly than on other breeds in the same feed lot.

The Montadale, being the descendant of the Columbia, should prove its value on the range, as well as on the farm, because they can "take it" along with any other breed and come out on top.

EDITOR'S NOTE (From the Sheepman): The above article was sent in by E. H. Mattingly and is reproduced for the information it contains. We do not know Mr. Mattingly and have never seen a "Montadale."

Coarse Feed Keeps Litter Drier

Maintaining dry litter in chick broods after the age of four to six weeks is difficult when they must be confined to the pen. Dry litter is desirable. It is an accepted fact that losses from coccidiosis are not likely to be as severe when dry litter is used.

Edmund Hoffman and A. E. Tomhave, University of Delaware Agricultural Experiment Station, report as follows in regard to a feed trial in which cracked corn made up a considerable amount of the diet in feeding broilers:

"The most remarkable point brought out by this feeding trial was the effect of the diets on the moisture condition of the litter.

"In the pen fed all-mash, the litter became very wet after the broilers were six weeks of age. In the other pens the litter was drier in direct proportion to the amount of cracked corn fed in the diet. It was necessary to add litter weekly to the pen fed the all-mash control diet, but only once during the entire period to the pen fed the largest amounts of cracked corn.

"It is thought that this difference in litter condition was not caused by feeding a diet of lower protein content, but rather by the effect of the diet on the broilers' feeding habits. The 16 and 18 percent feeds contained cracked corn which made them coarser, and evidently birds fed a coarse diet do not drink as much water as those fed a finely ground one.

"Birds eating a powdery, dry mash drink frequently to help wash it down. On the other hand, birds eating grains usually will fill up before they seek water.

"A logical assumption can be made that any water consumed to wash down feed would be in excess of the birds' actual requirements, which in turn, would increase the moisture content of their droppings as compared to birds eating grains or a coarsely ground ration and drinking a normal amount of water."

—*Poultry Tribune*

Balance in Plant Nutrition

Condensed from California Cultivator

R. E. Stephenson

PLANTS have an innate capacity for juggling the elements that they derive from the soil and that are necessary for normal growth and a good harvest. The great variability in composition of the same variety of crop, grown on different soils and under different conditions, attests this fact. Likewise, the capacity of plants for producing satisfactory yields on soils that are quite different in composition, is astonishing.

But there are limitations to what the plant can do for itself under adverse soil conditions. Plants will grow in acid soils and may thrive as well in the presence of fairly high acidity as in any other type of soil if the essential nutrients were sufficiently abundant, but highly acid soils are likely to be deficient in the available supply of some essential element. Acid soils may contain a good supply of total phosphorus, but they are also liable to contain considerable soluble iron and aluminum which fix or precipitate soluble phosphorus. Aluminum has even been found guilty of precipitating the phosphorus after the plant has absorbed it. This fixation prevents the plant from ultilizing the material for its nutrition, even though the phosphorus content of the plant cell might be normal in amount. The nutrition of the plant then becomes a question of whether enough phosphorus can be absorbed to provide for both aluminum precipitation and for plant metabolism.

The common practice of liming acid soils reduces the amount of soluble iron and aluminum and increases the solubility of the phosphorus. But, just as important perhaps, plants that are grown in limed soils absorb less aluminum and there is less precipitation of absorbed phosphorus within the plant. Therefore, the phosphorus nutrition of most plants is likely to be best in soils that are kept nearly neutral.

The absorption of the several nutrients may be affected by the relative proportion of the available supply of each in the soil. Badly leached soils are usually low in both available calcium and potassium and liming to correct acidity increases the available supply of calcium and still further exaggerates the potassium

Reprinted by permission from California Cultivator, Los Angeles, Calif., March 3, 1945

deficiency. The balance between potassium and calcium absorption is such that greater absorption of either one reduces the absorption of the other. Liming, therefore, may need to be accompanied by the application of a potassium fertilizer for best results.

The balance between calcium and boron is such that increasing the calcium supply may cause a boron deficiency, or increase the severity of one that already exists and may make boron fertilization a necessity. There is also such a close balance between potassium and boron that liberal use of potassium fertilizer may accentuate a boron deficiency. Boron toxicity, where there is too much boron in the soil, is reduced by liming but perhaps increased by the use of potash. These relationships exist because both calcium and potassium affect the uptake of boron by plants.

In one orchard area zinc was the most pronounced nutrient deficiency and use of zinc sulphate spray on the cherry trees produced remarkable improvement. A boric acid spray alone produced no noticeable effect, but when combined with the zinc the effect of the combination was superior to the zinc alone. Correction of one deficiency improved the nutrition of the plant enough to bring out another deficiency. On some fairly good soils, building up the general nutrition of sunflower plants with nitrogen, phosphorus, potassium and sulphur brought out a boron deficiency where none was observed before. This was due to sufficient stimulation of growth to exhaust the limited boron supplied by the soil.

The nitrogen supply has great significance in the assimilation of plant nutrients, because it has so much to do with growth. With the same mineral supply, abundance of nitrogen insures vigorous growth, while a sparse supply of nitrogen leads to stunted growth, which means small and sparse foliage and results in poor assimilation because the leaves make the carbohydrates and proteins required for assimilation and growth.

Nutrient elements that have similar properties may, to a limited extent, replace each other in the nutrition of plants. Although sodium is not considered an essential nutrient, it is enough like potassium to supplement that element in plant nutrition.

Thus a moderate amount of sodium, when the potassium in the soil is at a low level, may increase the efficiency of the potassium sufficiently to produce a bigger yield. It is possible, therefore, that sodium nitrate used on low potassium soils may benefit the crop not only by supplying nitrogen but by the good effect

of the sodium in increasing the efficiency of the limited potassium supply. For a similar reason, use of common salt sometimes increases crop yields. An improvement in the balance of nutrients brought about by the sodium in the salt is sometimes given as an explanation of its good effect.

Nutrients that are too much out of balance may produce a type of growth that is subject to tissue breakdown. This undesirable effect may occur even when the yield is unaffected. The Maine experiment station reports that blossom-end rot of tomato is associated with a low calcium content (less than 0.2 per cent in the fruit) brought about by unbalanced nutrients. High nitrogen, potassium, sulphur, magnesium or chlorine caused low calcium in the fruit and blossom-end rot. In some areas, phosphate-deficient trees have produced prunes that were subject to quick decay. An onion grower on peat soil was producing good yields with a fertilizer which carried little phosphate but the onions would not keep. After changing his fertilizer program to supply nearly 400 pounds of phosphoric acid an acre, as well as nitrogen and potassium, he had no more trouble with breakdown.

Therefore, to produce good yields of high quality products, use of a complete fertilizer may be justified as a means of avoiding the danger of throwing the nutrition of the plant out of balance. Complete and balanced fertilization means supplying all nutrients that might be deficient, without having any that is too much in excess. To supply more of an element that is already sufficiently abundant, without building up others, may throw the nutrient supply so out of balance that yields are cut or the quality of the product is impaired. As one author puts it, balance between nutrient elements may be more important to the nutrition of the plant than the actual concentration or total amount of the various nutrients that is supplied, as long as a general deficiency does not develop.

Just as nutrition is improved by some semblance of balance among the essential elements, the toxicity of certain nonessential elements may be reduced by the proper balance between them and a similar essential element. In some areas there are toxic concentrations of selenium in the soil, the toxicity of which is reduced by application of sulphur. Toxicity of arsenic, sometimes added to soils in injurious amounts by use of spray materials, is reduced by applications of phosphorus fertilizers. In this way what might be an excess of an essential element under nor-

mal conditions becomes helpful in protecting the plant against injury from the similar but toxic nonessential element, and yields are increased.

All this points to the conclusion that either excesses or deficiences of essential elements may disturb the nutrition of plants and lower profits either through reduced yields or impaired quality of product, and that toxic effects of some nonessential elements may be at least partially overcome by supplying another but similar essential element which enables the plant to reduce its absorption of the toxin, or partially neutralizes the poisoning effect of the toxin. Some orchard soils are now so polluted with spray residues that the soil has become poison to sensitive plants and a corrective program has become necessary. Some of these toxins are partially neutralized, either directly or indirectly, through the use of barnyard manure and other humus-renewing materials. Thus the use of fertilizers, lime and manures may serve a double purpose; that of building up the available supply of essential nutrients and that of counteracting the injurious effects of unessential elements that may be found in soils, and this through providing better balance for the nutrition of the crop.

A program of complete fertilization in the future is likely to provide more elements than in the past, both because new deficiencies are constantly appearing and because more liberal use of a few elements will in time make it necessary to build others to a higher level for good nutrition. A high level for one or two elements may be disastrous whereas a high level for all the essential nutrient elements would be favorable to good yields and high quality.

Inheritance Must Be Supplemented

Condensed from Herd Builder

Leland W. Lamb

THERE are two factors, both of which must be present in dairying if high and profitable milk production is to be obtained. They are (1) an inheritance for high production, and (2) feed and care (environment) which will not limit or hold down that inheritance in its efforts to express itself. With either factor missing the other will not result in high production. True, a cow possessing an inheritance for high production will be more efficient when underfed than will a cow with low production inheritance. Hence, on the same feed she will produce more than the low-inheritance cow.

Conversely, on liberal feeding the cow with high inheritance will yield large quantities of milk and not get fat, unless she is over fed, whereas the low inheritance cow will produce small quantities of milk and *get fat.*

Must Breed Inheritance into Cows—Our jobs as dairymen are, first to breed the inheritance for high production into the cows we raise, and this can only be done by the use of bulls that have the ability to transmit high production to their daughters; and second, to feed, milk and handle them in such a way that inheritance can express itself in all the production of which they are capable.

The best bull in the world can do no more for you than to sire heifers which have the ability to produce. Whether or not they ever do actually produce at profitable levels for you depends largely on you. After the good bull has been used and the resulting calf has been born the job is yours. Nothing you do can change the *inherited ability* of that calf. Yet, the way you handle that calf, as a calf, later as a heifer, and still later as a cow, can make all the difference in the world in the actual production of that cow.

Development Limits Production—Remember that a calf is born with the plans all drawn for a certain size and shape of cow. She is likewise born with certain very definite limitations in her ability to produce. Your next job is to give that inheritance an opportunity to express itself. For instance, if the plans with which that calf is born call for a 1200 pound cow you can never make

Reprinted by permission from the Herd Builder, of the American Dairy Cattle Club, January 25, 1945

a 1400 pound cow out of her, except of course by fattening her so that she carries 200 pounds of excess baggage. Even then she will never put that excess "in the bag" so you can milk it into the pail.

On the other hand, it is possible to handle that calf, by underfeeding while young, too early breeding, and poor feeding while in milk to so stunt her growth that, instead of developing into the 1200 pound cow for which her plans called she may weigh only 1000 pounds or less at maturity. In such case you will never get the same level of production nor the same profit from her as you would had you developed her out to the limit of her inheritance.

Management After Maturity Influences Production — We should always keep in mind the fact that these same plans which determine the size and shape of a cow at maturity also limit the maximum production of which she is capable under any set of environmental conditions.

Likewise, we should also remember that the generally accepted standard milking period for a cow is ten months, or 305 days. Also, the standard basis of reporting records is on the twice daily milking (2x) mature basis. This standard provides for a reasonable length of lactation followed by a reasonable dry period if the cow is to freshen again twelve months after the birth of her last calf. This is the ideal toward which a breeding management should be aimed.

Our aim should, therefore, be to induce the highest production of which a cow is capable in the 305 day, 2x milking period.

That management after maturity greatly affects such production is dramatically shown by a certain group of cows sold within recent years by one Associated Breeder to another.

Nine of these cows have lived through four separate management regimes. (1) First owner; (2) second owner with herdsman No. 1; (3) second owner with combination of herdsmen No. 1 and 2; (4) Second owner with herdsman No. 2. These cows came to the second owner with records averaging 446 lbs. butter fat on the 305 day, 2x mature basis. Eight of them completed records in the second owner's barn under the care of herdsman No. 1. Their records averaged 471 lbs. butter fat. Six of them started their next records under herdsman No. 1 and completed them under herdsman No. 2. These records averaged 483 lbs. butter fat. Eight of the original nine cows have now completed records under the sole care of herdsman No. 2. Their records average 354 lbs. butter fat.

Along with the nine cows men-

tioned above, owner No. 2 purchased some heifers milking with first calf and some heifers which had not yet freshened. Altogether 15 cows completed records under herdsman No. 1's care. They averaged 471 lbs. butter fat. Likewise, 15 cows started lactations under care of herdsman No. 1 and completed them with herdsman No. 2—average 468 lbs. butter fat. Now 16 cows have completed records entirely under care of herdsman No. 2. Their average has dropped to 327 lbs. butter fat.

Not one of these cows has produced as well for herdsman No. 2 as she did for herdsman No. 1 or during the combination of the two herdsmen. Two have produced less than 50% as much and eight have produced more than 100 lbs. butter fat less for herdsman No. 2 than for herdsman No. 1.

These cows, producing from 18 lbs. to 406 lbs. butter fat for herdsman No. 2 are the same cows as previously. They have the very same *ability* for production as they carried when Herdsman No. 1 took charge of them. There is no difference in the cows. The difference is in their environment. Herdsman No. 1 gave their inheritance full opportunity to express itself. Herdsman No. 2 is limiting that inheritance by the environment he is providing for his cows. He is not giving those cows the feed and care they need to produce up to the limits of their inherited capacity.

This illustration shows the results of providing poor feed, care and management for what are known to be good cows. It shows, by means of actual figures, that inheritance for high production must be supplemented with proper feed, regular and careful milking, and with proper care and management if the milk and butter fat production of which these cows are capable are to be obtained from them.

Know Your Phosphates!

Condensed from Farm Science Reporter

H. R. Meldrum

IF WE ARE to keep up crop yields and quality, many of our soils must have phosphate fertilizer. If we can't get enough superphosphate because of the war, then what about the other phosphate fertilizers? Can they "pinch hit" for superphosphate?

We have done a lot of comparing results of superphosphate with rock phosphate here at the Iowa Station, and Station workers in cooperation with farmers have made many tests over Iowa on several different soil types. From these many years of testing, here are our conclusions and recommendations:

Results, Recommendations

1. Superphosphate generally gives higher increases in crop yields than rock phosphate. On certain soils, however, especially with legume crops, rock phosphate has given good results.

2. Only slight response is obtained with rock phosphate the first year, while superphosphate gives immediate returns.

3. Rock phosphate is more effective on acid than on limed or neutral soils, but it cannot take the place of lime.

4. Rock phosphate is cheaper per unit of total phosphorus than superphosphate but much larger amounts are required because of its low availability.

5. The best place for rock phosphate is with alfalfa and clover seedings, particularly sweet clover. The rate recommended is 500 to 800 pounds per acre.

6. Twenty percent superphosphate (0-20-0) should be used at from 150 to 200 pounds per acre for small grain and biennial legume seedings such as red clover and sweet clover. When alfalfa is seeded we recommend from 250 to 300 pounds per acre.

7. For corn we recommend about 100 pounds per acre of 20 percent superphosphate, or of a mixed fertilizer containing superphosphate, applied with a corn planter attachment at planting time. When broadcasting superphosphate for corn, about twice as much is necessary.

8. The supply of superphosphate during wartime will not meet the demand, and rock phosphate may well be used, especially for legume seedings where the soil is not alkaline or the acidity has not been fully corrected by liming.

Lack of available phosphorus slows down plant growth, delays

Reprinted by permission from the Farm Science Reporter, Ames, Iowa, Jan., 1945

maturity and lowers the yield and quality of crops. Phosphorus is one element that is rapidly removed from the soil either in livestock or grain farming. Animals use the phosphorus in the feed they eat to build their bones —their bodies. We cannot avoid eventually having to replace this phosphorus which we are continually removing with any type of farming.

Only a small part of the phosphorus in our soils is available for plant use in any one year. So the availability of phosphate fertilizer applied is of importance if we are looking for quick returns. Phosphorus must be soluble to enable plants to use it. If one understands the characteristics of the various phosphate fertilizers, he is not so likely to be "taken in" by sales talk.

Phosphate Fertilizers

Rock phosphate is a finely ground phosphate-bearing rock, containing from 30 to 33 percent *total* phosphoric acid. Only a small amount of the phosphorus in it is readily available to crops —the amount varying with different soils and crops. Legume crops such as red clover, alfalfa and sweet clover have a greater ability to use the phosphate in rock phosphate than the grain crops. Rock phosphate is less available in well-limed, neutral or alkaline soils than in acid soils, and it ordinarily should not be used on neutral or alkaline soils.

Rock phosphate has a place in a long-time soil-building program on some soils, but because of its slow availability, do not expect quick returns from it. Rock phosphate has no appreciable effect in correcting soil acidity, and there are no experiments indicating that the small amounts of other minerals in rock phosphate are of any direct benefit to crops and soils.

Superphosphate, a commercial product obtained by mixing rock phosphate with sulfuric acid, contains phosphorus in a form quickly available to plants. It is the most commonly used phosphate fertilizer. Superphosphate is usually sold under the label of 0-18-0 or 0-20-0, the middle figure designating the total amount of *available* phosphoric acid it contains. Higher analysis superphosphates are available in limited amounts.

Colloidal phosphate is a finely divided, relatively low grade type of rock phosphate or phosphate clay. It usually contains from 18 to 23 percent *total* phosphoric acid, with only a small amount readily available to plants. Experiments in some states have shown that colloidal phosphate has about the same fertilizing value as rock phosphate when it is applied on a phosphorus-equivalent basis.

Since colloidal phosphate contains only about two-thirds as much total phosphoric acid as rock phosphate, it has less value, ton for ton, and should be applied at a correspondingly higher rate than rock phosphate. If you consider buying colloidal phosphate, be sure to consider the comparative prices per unit of phosphoric acid with what it would cost you in rock phosphate.

Air Transport for Certain Crops

Condensed from Better Crops With Plant Food

C. B. Sherman

U. S. Department of Agriculture, Washington, D. C.

AIR TRANSPORT for certain crops is definitely in the post-war picture. War has accelerated the use of airplanes for freight. Cessation of hostilities will bring an expansion of civilian air transport of all kinds to take up the slack and to have the benefit of this speed in business. Agriculture must be ready to get its share.

In preparation for this chance that looms on a not-distant horizon, R. W. Hoecker has been busy for the past year investigating, under actual conditions, certain perishables and scrutinizing the ifs and buts to learn exactly what the possibilities are for these crops. He now has some rather specific facts.

Working in the United States Department of Agriculture, he has released results in regard to tomatoes, lettuce, and strawberries. He has been assisted in this work by the airplane industry, the fruit and vegetable industry, and the Edward S. Evans Transportation Research, which is a special grant for air-cargo research. And still the work goes on. The market value of these commodities is increased by high speed transportation and special care in handling—attributes that suggest at once an adaptability to practical air transport.

Then vegetables and fruits are particularly attractive to the airlines as air-transport possibilities because they would supply South-to-North and West-to-East cargoes to balance the opposite flow of industrial products.

In Dr. Hecker's studies the tomatoes and strawberries originated in the vicinity of Lakeland and Miami, Florida, whereas the lettuce originated in the Salinas

Reprinted by permission from Better Crops With Plant Food, Washington, D. C., February, 1945

Valley of California. All had Detroit as destination. Only the assumptions that general readers will want to know are outlined here since reports carrying full details are now available to those who can make use of them.

The types of airplanes used in the studies were the C-47 Transport and the C-54A Transport. The C-47, the military equivalent of the Douglas DC-3, was widely used by the commercial airlines before the war. It is supposed that these planes will be available from the military services at lowered prices when the war is over. Ice refrigeration will not be necessary. Paper containers may well be used for tomatoes, strawberries, and lettuce. Those already manufactured for tomatoes are 3 pounds lighter than the 30-pound lug box now in use, and for lettuce the paper containers weigh 3¾ compared with the standard 10-pound wooden crate. As ripe fruit can be shipped by these speedy methods, the cost of ripening tomatoes would be saved, as well as the spoilage and waste incident to the practice.

Enhancement of quality in the perishable products offered to customers on the retail market when carried in this way from the distant fields is obvious. Vine-ripened tomatoes and sun-ripened strawberries have flavor and appeal of their own. To bring strawberries from Florida to Detroit by railway express requires a minimum of 3 days and by rail freight and truck a minimum of 4 days, and tomatoes take slightly longer. By air, the time in each instance is between 6¾ and 7¾ hours. Produce may be harvested during the morning of one day, pre-cooled in the afternoon, loaded on the plane in the evening, transported overnight to the northern consuming center, and placed in retail stores the day after harvesting. The more advanced stage of natural ripening before the products are harvested means, in most cases, a considerable increase in palatability and vitamin content, and some increase in yield per acre.

When using paper containers, the cost of air transport was approximately 5½ cents more per quart for STRAWBERRIES than when they are carried by rail or truck and 5 cents more than rail express. This difference would apparently have to be covered by a difference in price charged for these better berries.

Analyses used in this study included the estimated charges for trucking from the production center to the airport, loading the airplane, the airplane flight from airport of origin to airport of destination, unloading, trucking the cargo to the produce terminal in the city of Detroit, and unloading the produce at this terminal.

When balancing the savings to be gained by air transportation of RIPE TOMATOES against the additional cost of being flown, they are found to be about equal. Using existing air equipment and with approximately the present costs, air-transported tomatoes in paper containers can apparently be placed on retail counters at approximately the same price as those transported by surface carriers and ripened at destination.

Actual selling experience in regard to four test air shipments of the California LETTUCE was carefully checked. Inspectors found that the heads arrived in greener color than the lettuce which came by rail and that the color persisted better throughout the heads. The first shipment was slightly wilted when shipped and slightly wilted on arrival but the other shipments arrived in cool and crisp condition. There were no apparent ill effects from the air trip and there was some decided advantage in appearance.

This lettuce was offered at 5 cents a head higher than the price at which other lettuce was selling on the same market, as this represented about the difference in the cost of transport. Self-service stores were used in a locality that has customers of slightly better incomes than average. The airborne lettuce sold as well at the higher price as did the surface-borne lettuce at 5 cents per head less.

Just what the effects on costs and prices would be of a great volume of agricultural transport by air, possibly cheaper rates, fluctuations in consumers' incomes, and the sundry other considerations that spring to mind have not yet been measured. But the Secretary of Agriculture, after watching these experiments, says that the telescoping of time and space presents to us a challenge, as well as an opportunity, and that he is convinced air transport gives a very real prospect of developing new and improved methods of moving certain farm perishables which will benefit both producers and consumers.

Liming the Land

Condensed from Commercial Fertilizer

Firman E. Bear

Soil Chemist, New Jersey Agricultural Experiment Station, Rutgers University, New Brunswick, N. J.

SOMEONE once coined the phrase, "Don't put it off, put it on," in referring to the use of lime. Now, more than ever, there is widespread need to give greater heed to this admonition. Well-limed soils are highly fertile soils, and the appearance and yield of the crops that grow on them are evidences of this fact. Yet if one were to select a large number of samples of soil from the farms of New Jersey and examine them in the laboratory as to their need for lime he would be impressed with the high percentage of them that are strongly acid.

The fact that many New Jersey soils are acid cannot be laid at the door of farmers, because they are using large tonnages of liming materials, and these tonnages are growing greater every year.

The reason why we still need to use much more lime than we do is that the soils of this area are the victims of heavy rainfall which, over the centuries, has washed most of the natural lime out of them and carried it out to sea. And what we have to do is to haul it back—not the same lime, to be sure, but other lime that, ages ago, was laid down on the ocean floor and has since been pushed up out of the water to form dry land. Thus, the limestone quarries of today were the sea-bottom sediments of yesterday.

When a soil needs lime it is said to be acid, and the amount of acid in the soil can be accurately measured. To measure it, the chemist makes use of an instrument known at a potentiometer which records the acidity in pH values much as a thermometer, placed in the same soil, would record its temperature in degrees. The Fahrenheit thermometer scale runs from 0 to 212, and the pH scale runs only from 0 to 14. But just as the best temperature for crops is a little less than half way between the two extremes, so also the soil is in best condition with respect to the growth of most crops when its pH is a little less than 7, the halfway point. (Important exceptions to this rule are potatoes,

sweet potatoes, and blueberries, the soil pH for which is normally kept at about 5.2.)

Recently the Soils Department collected typical samples of 20 of the most important types of soil in the State. An effort was made to choose these samples from areas of land that had never been farmed, in order to know what the soil was like before the first white man turned it over with his plow. The pH of 10 of these soils, to an average depth of about 30 inches, was below 5. This means that these 10 soils, in their natural state, were strongly acid as far down as the roots of plants normally go. Five more of the 20 soils were acid, at least to plow depth, and only the remaining 5 were rich in lime. Although the Indians who originally roamed the woodlands of this State knew nothing about lime, they undoubtedly had observed its effects in the better growth of timber on the limestone land, and in the density of its wildlife population.

But we now know that most New Jersey farmers start with a natural handicap of having a soil that is strongly acid. Their land needs not only enough lime to overcome the acidity to plow depth but often at least as much more to take care of the needs of the second plow depth immediately beneath.

The amount of lime required to raise the pH of a soil from any one point to another depends upon whether that soil is a sand or a loam. Thus, to raise the pH of the plow depth of one acre of Sassafras sand (one of the 20 soils under study) from 5.0 to 6.5 requires only about 1,000 pounds, but 5,000 pounds are needed for Penn silt loam. This means that although 1 ton of limestone per acre might be plenty on a sandy soil having a pH of 5, for most soils, 2 tons per acre would be better. Four tons per acre would not be too much on an acid Penn silt loam, if one wanted to lime both the plowed soil and the subsurface as well.

In liming land, one has a choice from among a considerable variety of products, including limestone, hydrated lime, quicklime, oyster shells, blast-furnace slag, and a number of waste-lime materials. In making the choice one must know how finely pulverized these liming materials are and their percentages of calcium and magnesium oxides. Assuming that the products are 10 percent pure, and that they are fine enough to pass a 100-mesh screen (such a screen has 10,000 openings per square inch), 1 ton of limestone is equivalent to about three-fourths of a ton of hydrated lime, or to about one-half ton of quicklime.

If one uses liming materials in

the proportions indicated, the more or less permanent effects of these three types of products will be practically identical. One can, of course, find many farmers who, from years of experience, favor the hydrated or burned lime, but he can find equal numbers of them who have long since decided in favor of the pulverized limestone.

Occasionally the question arises whether one should use a liming material that is high in magnesium rather than one that is made up more largely of calcium. It happens that most of the high-calcium products contain some magnesium, and if one limes as liberally as he should, the needs of the soil for this element are normally cared for. If one is in doubt, however, he should not hesitate to use the dolomitic (high-magnesium) type of liming materials.

One good reason for applying lime is that there is a shortage of nitrogen, which must be made good by the growth of legumes as cover or sod crops, and lime helps legumes succeed in their job of taking nitrogen from the air. Another reason is that the more lime one uses the less fertilizer he needs to apply, because lime makes the natural supply of soil elements more available.

Any farmer who is looking for some means by which he can more effectively aid the war effort need look no farther than his own farm. He can do his bit better by putting on lime and plowing it under, and then making a second application after plowing. By this means he will get the lime down deeply into the soil, as well as on the surface, so that once the young plants get under way they can send their roots down below plow depth where there is more moisture in time of drouth and a large amount of extra plant food that, in acid subsoils, largely goes to waste.

Modern Trends in Dairy Cattle Nutrition

Condensed from The Brown Swiss Bulletin

C. F. Huffman

Institute of Nutrition and Dairy Department, Michigan State College, East Lansing

THE PRIMARY function of the dairy cow is to convert roughages and other home grown feeds into human food. The war years just behind us have demonstrated the need of fitting the cow to the land, and the land to the cow. Dairymen who have grown most of their feed have not been at the mercy of the very tight feed situation.

The basis of dairy cattle feeding is roughage. Nature geared the cow in no uncertain terms for such a job. No longer are the extra stomachs of the dairy cow looked upon as just a place to store a lot of feed so that old Bossy can eat her fill and then retire to a shady spot and chew her cud. The light of research is being directed into the darkened compartments in an attempt to find out more of the "goings on" in these places.

The discovery of countless millions of bugs (germs) in the spacious paunch has led to a study of their role in the nutrition of the cow. It appears that the microscopic life in the rumen serves two functions, the digestion of roughage and the synthesis of compounds that are needed to maintain the health and milk production of the cow.

The first function, that of digestion, is the fundamental reason why the dairy cow fits in so well with soil conservation. About 60 per cent of the dry matter in alfalfa hay is not digested at all, or is digested by the paunch germs. This is the reason why cows are so much more efficient in handling roughages than chickens, pigs and even horses.

Some one has referred to the paunch as the cow's fermentation vat, as indeed it is! During fermentation large amounts of acids are formed which are neutralized by the enormous amount of saliva (110-120 lbs. per day) produced. The equivalent of about three-fourths pounds of sodium carbonate are carried into the paunch each day in the saliva. The saliva of the cow also serves the purpose of keeping the cow's breath sweet.

Unfortunately the bugs in the paunch produce carbon dioxide and methane gas as by-products of their activity and on certain occasions are believed to be re-

Reprinted by permission from The Brown Swiss Bulletin, Beloit, Wisconsin, Dec., 1944

sponsible for bloat. Many theories have been advanced to explain bloat. According to one theory, bloat is due to eating too much heavy legumes in too short a time, which results in plugging the lower end of the esophagus so that the gas cannot be belched. Another theory supported by considerable research explains bloat as being due to the lack of coarse feed needed to tickle the wall of the paunch to stimulate the belching act. Young legumes which are the worst offenders are not of a fibrous nature. Another theory explains bloat on the basis of absorption of toxic gases such as carbon monoxide and hydrogen-sulfide.

The trend in dairy cattle nutrition is to study the diet needed by the bugs of the digestive tract. A disease characterized by lack of appetite and abnormal shaped red cells was cured by vitamin B_6. No doubt the ration of these animals did not contain all the dietary principles needed by the paunch bugs, since normally plenty of this vitamin is made in the rumen.

The nutritive value of young pasture grass for milk production is well known. As the plants grow larger and older, many changes take place which lowers their nutritive power. We know that the protein, carotene and other vitamins decrease and that fiber increases with maturity. At a certain stage, there is a marked drop in digestibility of the dry matter. The most important change, however, is the drop in milk stimulating power of the digestible matter. The more mature the roughage, the less milk, and the greater the need for grain.

The low value of mature roughages for milk production is not due to calories. The addition of starch or sugar to an all alfalfa ration did not increase milk production. When an equal amount of corn or wheat replaced the starch or sugar, milk production increased against the declining tide of advanced lactation. It appears that there is an unknown factor in young grass and in grains which is needed for milk production. As a matter of fact, the first reason for feeding grain as a supplement to roughage during the barn feeding period is to furnish this unknown factor.

Unfortunately, it is not possible at the present time to grow and harvest grass for winter use. It is highly desirable, however, to cut hay at the early bloom stage in order to improve the value of hay.

The conservation of roughage so as to make it more potent as a feed is receiving a lot of attention. Different methods of curing and storing hay are being studied and farm machinery is being designed to do a cheaper and a better job.

Since dairy cattle are usually fed rations grown on the home farm, there is a much greater possibility of a deficiency in the ration than when most of the feeds are grown on many soil types and under different climatic conditions. This is especially true of mineral deficiencies.

Phosphorus deficiency may occur on certain farms due to a lack of phosphorus in the pasture and hay. Unfortunately, the symptoms of phosphorus deficiency are identical with the symptoms of some other deficiencies that sometimes occur. In marginal phosphorus deficiency the chewing of wood, hair and metal objects is observed. In extreme phosphorus deficiency a lack of appetite is the chief symptom. These same symptoms are also observed in iron and cobalt deficiencies. In herds where depraved appetite occurs, if the calves are affected but the cows are not, it can be assumed that phosphorus is not the lacking factor. On the other hand, when the young stock is normal and the cows have a depraved appetite, it is advisable to feed a phosphorus supplement. Odorless steamed bone meal and low fluorine phosphates are good concentrate supplements. Such feeds as wheat bran, wheat middlings and cottonseed meal are also good sources of this element.

The extent of cobalt deficiency among cattle in various sections of the United States remains unknown. It is, however, the most common mineral deficiency among cattle in Michigan. It is not limited to any one particular area as was formerly believed. Calves are more likely to be affected than cows. A very small amount of this element as a supplement works like magic on farms where it is needed. The effect on appetite occurs within a week. On farms where calves are chewing wood, add one ounce of cobalt sulfate to a gallon of water; feed one teaspoonful of this solution per calf per day. In feeding cows, however, a better method is to mix a half ounce of cobalt sulfate to 100 pounds of salt.

On farms where a cobalt supplement fails to stop the chewing of wood, an iron supplement is indicated. The method of administering iron and dosage to use has not been worked out completely.

The use of iodized salt is indicated on farms where big neck occurs.

The calf comes into the world with a digestive tract similar to a pig or chicken so far as germ life is concerned. Its big problem is to get by until the paunch is developed and a normal bug population is established. Recent work by Dr. Paul Phillips, of the University of Wisconsin, indicates the possibility of vitamin deficiencies producing some of the

early calfhood diseases such as scours, pneumonia and navel ill. The calf comes into the world depleted in vitamin A. Usually the colostrum contains plenty of this vitamin to give it a good start in life. It is believed, however, that the first milk may vary about 10 times in this vitamin. The type of scours caused by a lack of vitamin does not respond to ordinary treatments such as the administration of sulfa drugs. According to Dr. Phillips the administration of vitamin A, vitamin C and niacin prevents and cures these calf troubles. The value of vitamin therapy in calf scours caused by virulent germs has not been determined.

The role of nutrition in stepping up breeding efficiency in the cow and bull is also being investigated. A certain amount of sterility in both sexes appears to be associated with subnormal vitamin C metabolism.

Corn Borer

A new insecticide named "Ryanex," prepared from a tropical plant, has given satisfactory results used as a dust or spray against European corn borer in eastern New York. In preliminary trials it surpassed rotenone, nicotine, and other materials commonly used against this pest. In fact, it was essentially equal in effectiveness to DDT under 1944 conditions in the state. Fifty-percent Ryanex dust costs about the same as 1-percent rotenone dust and is expected to be available in limited amounts in 1945.

—*Successful Farming*

Saving Feed and Labor

Condensed from The Michigan Farmer

S. B. Thomas

Livingston County Agricultural Agent

THE scoop shovel method of feeding dairy cattle has been replaced by the "mess kit feeding cabinet" on the State Sanitorium farm at Howell, Michigan. Basil White, farm superintendent, and his right hand man, Roy Bishop, designed and built this gadget. Mr. White points out that this system of feeding conserves feed and labor, but still treats each cow as an individual.

The cabinet is approximately 36 inches wide, 42 inches high and 42 inches long. It is built on these dimensions so as to accommodate 25 individual feed boxes on each side. These feed boxes are approximately 15 inches long, 6 inches wide and 6 inches deep. The reason for the feed boxes being of this dimension was to accommodate the greatest amount of feed that is ever fed at the institution. The entire cabinet is mounted on rollers so that it can be pushed down the feed alley and the cows fed from both sides of the cabinet. Each of the individual mess kits have a number on them corresponding to the cow number. The amount of grain that this individual cow is to receive is shown on a card which is fastened to the box. The amount of grain each cow receives depends upon the milk she gives. By the use of the daily milk records this amount may be varied from time to time by Mr. White.

As the grain is weighed out for each cow it is placed in her mess kit in the cabinet and is ready for the next feeding. When asked why this system was devised Mr. White gave the following reasons: "It is impossible for me to be here in the barn at every feeding, and I want to know how much these cows are being fed. By having the grain ration set up before feeding time I can check to see that the cow requirements are being met. We can save more than 50% of the time formerly needed in feeding the herd. There is no loose grain in the stable which a cow might get to if she happened to get loose. In the 2 weeks that we have used the outfit we have averaged a grain saving of 50 pounds of grain per

feeding. That makes 160 pounds per day. During the same period of time we have increased the daily milk production by 100 pounds of milk per day."

The 53 cows in this herd have all been raised by the present farm superintendent so he is pretty much interested in their well being. Roughly speaking the institution needs a ton of milk a day. With careful management and planning the herd keeps ahead of this need so you can see why Basil White is interested in every individual in the herd.

This system is not necessarily for the herd with a large number of cows. It will work with the same efficiency in the smaller herd. By weighing the grain a more accurate check on production records may be obtained on each cow, consequently a more economical use of grain.

Raising Geese at Ark Farm

Condensed from The Rural New-Yorker

Willet Randall

In most foreign lands geese are raised in larger numbers than they are here, but our interest in them during the last few years has come along rapidly, because they can be raised on cheaper feeds and with less loss or risk than any other kind of fowls.

The four recognized breeds raised largely for market are Toulouse, African, White Chinese and Embden; the last two are all white. Toulouse and Embden are the largest, and the Chinese the smallest. All are good, all are excellent layers and their demand as breeding stock appears to be about equal. Any of them with proper care will lay an average of 35 eggs per season and most of them many more, depending upon their care, feed and management.

Because they are easier to raise than other fowl, more hardy and require inexpensive feed, their main diet being green grass, geese can be profitable. They are not subject to the many diseases of chickens, do not harbor lice, they never turn cannibal, and have no egg trouble. You can range them year after year over the same ground which you cannot do with chickens or turkeys. Then, too, their winter quarters are of the cheapest, since they are always hardy and stand any amount of cold. An open shed answers well, and many who raise large flocks let them run in the barnyard through the winter. We do this ourselves with the main flock.

The proper location for breeding geese is a swampy corner of the farm where a spring-hole can be dug out provided you have no small pond or running stream. Geese do not need water to swim in, although the eggs will be more fertile if they have it, because the mating is done in the water when this is available. Fence the enclosure and provide an open shed facing south. If necessary, the breeders can be kept there the year 'round, but if grazing can be had on the cut over meadows, the geese will find all their own feed after laying ceases in early July, until fall.

In starting a flock, baby goslings or half grown geese are probably best and cheapest in the long run; but it is not easy to get day-old goslings because it pays the raiser best to mature

Reprinted by permission from The Rural New-Yorker, January 6, 1945, New York City

them and sell them as breeders in the fall or to ship them to customers when they are two or three months old. This last method, like started pullets, is finding favor and is the best way of all. Of course, in buying half grown birds, the sexes cannot be guaranteed, but they usually run about 50-50 and the extra ganders are always in demand toward fall or at the holiday season.

Mature breeders, if available, must be located in the fall so that they acquaint themselves with their new surroundings. Then, too, if they are not accompanied by their old mates, it may take some time, maybe a season or more, before they settle down, accept their new mates and are ready to lay.

If the number of the sexes are equal, geese will pair; once well mated, each pair usually stick together, even if run in with a band where flock mating is practiced. Our own records show that where individual pair matings are used, we raise more goslings from each pair than we do where two, three, or more females are run with a single gander. If large numbers are to be raised, then of course the flock system should be used, and in this case 10 to 20 or many more females are yarded together with ganders in a proportion of not more than one to three, preferably two females. Even in the flock mating, the gander will always pick a favorite and stick by her, although he will choose up and mate with any extra female that may not have a mate of her own. In the early part of the season, the gander follows the goose, but the plan is reversed after egg laying stops and the goose follows the gander.

Geese are noisy, and they should not be kept where neighbors are close, for all through the breeding season there is much talk among them.

An old female is a better layer than a young goose in her first year, and each succeeding year after the first, they add a few more eggs to each clutch, and the eggs from the old ones are larger and produce a better gosling. Once you have old mated stock, do not separate them as long as they breed well together. Occasionally, a Toulouse gander after five or six years may get so cross you have to dispose of him, and sometimes he gets so heavy, because of the extra feed given the layers, that he grows sluggish and clumsy, and may not fertilize the eggs as well as a younger gander.

Of late years since the selling of two- or three-month-old goslings has been practiced, we are getting our geese to lay earlier and using sprouted oats as the first greens before grass arrives. This works well and appears to answer every purpose and it in-

creases the number of eggs we get per goose since the season is lengthened by a month or more.

When goslings are incubator hatched, they should be brooded exactly the same as chicks and fed much the same way, with the addition of all the green food they will eat. Gravel, water and minerals must be supplied. Water should be kept in receptacles so arranged that the small goslings cannot get into it to bathe. Keep them out of the water until they are half to fully feathered, then turn them in; but gradually, until the oil has come in their feathers.

The rapidly expanding practice of cross-breeding chickens also applies to geese. Such geese mature quicker and feather more rapidly, and in less time, than each or any of the breeds in their purity. Then, too, the females of the crosses are by far superior to the straight bred females.

In these cross matings we use the African and the White Chinese ganders with either pure Toulouse or Embden females. Do not reverse the sexes. The females from this cross are later mated to pure Toulouse or Embden ganders where it is desired to kill all the off-spring for market purposes. Do not carry the cross-breeding another generation, or you will run into mongrelism. It works the same as with chicks in all crosses, except that with the geese we save the first-cross females as future breeders when only market goslings are wanted. If one desires to establish a pure-bred goose business to be sold as breeders, then of course only the pure breeds should be selected and used.

Thinning of Peaches

Condensed from The Eastern Fruit Grower

L. W. Moore

Burkeville, Va.

It was four years ago that I entered the commercial fruit growing field and have since learned to truly appreciate the meaning of the words "orchard problems."

A few years ago I didn't believe very strongly in any short-cut methods to hand thinning of peaches; it appeared a slip-shod method of getting a job done with little regard for thoroughness.

The labor shortage, upon which hinges many of our problems, has brought about a marked change in our way of thinking and of doing things. It has made it necessary to find short-cuts, and rapid methods of doing a job, if the job is to be done at all.

After combing the country-side for labor, I finally succeeded in rounding up two old negro women and four small kids, to begin the job of thinning five thousand trees. It seemed a hopeless task until the German prisoners of war, a vast source of potential labor at my elbow, were finally released to work on farms.

It was evident from the beginning, that the old conventional method of thinning peaches had to be thrown overboard for some speedier method of removing the surplus fruits.

A heavy cushioned maul, which has been used in this state before, was tried. This was used to strike the main scaffold branches, and to strike them with such force that a third of the tree would be thinned with one blow. This proved to be too crude a method, resulting in an uneven distribution of the fruit, and it was rather rough on the tree.

A smaller jarring instrument, which could be used to strike the smaller branches, seemed to be the answer. This proved to be a fifteen-inch length of old rubber spray hose. A large tree was thinned in five minutes with this hose. The fruits were as evenly spaced as they were on an equal size tree which required one hour to thin by hand.

It was necessary at first to use

Reprinted by permission from The Eastern Fruit Grower, Charlestown, West Virginia, February, 1945

a step-ladder on the large trees with this short length of hose. To speed up the job the cumbersome ladder was discarded and the hose was fastened to the end of a five-foot stick. The large trees were thinned from the ground with the hose thus extended. It can be handled skillfully in this manner with a little practice.

The hose cannot be used effectively until about a week or ten days after the first drop has taken place, or until the fruits have developed to the size of a small walnut.

In our section the first drop was complete by May 13. The tip of the pit began to harden on May 29, and by June 2 the pit was fully hardened. We have then a period of about two weeks in which to complete the job of thinning with the hose. Results will be disappointing if the thinning is delayed until after the pits harden.

The job was completed in seventeen days with from fifteen to seventeen prisoners. Five aggressive hands could have easily done the job in ten days. Two hundred and fifty-six man days were expended at a total cost of $650.00. The average cost was fourteen cents per tree. The prisoners averaged eighteen trees per day per man.

A true picture of the effectiveness of hose thinning is not shown in the graded fruit. Two factors are responsible for the low percentage of two-inch fruit. As before stated thinning was started too late for best results. Thinning was completed just four weeks before harvesting. Rainfall was very deficient at a critical time in the development of the fruit, however, late thinning must share the greater responsibility as will be shown later.

The fruit packed out thirty-two per cent two inches and up, and sixty-eight percent one and three-fourths inch min. The per cent going under one and three-fourths inch was negligible.

I have a brush thinning tool which was supposed to have been made to the exact dimensions of brush exhibited at this meeting last year by Dr. Magness. An error was made in the dimensions somewhere along the line and this is the result. We are fortunate that this mistake was made for we have now a modification of the original brushbroom. We may well name this a brush "whisk broom."

The wires in this whisk broom are of number fourteen gauge steel bed spring fastened to a twelve-inch wooden handle. There are twelve of these wires, three inches long, fastened in a fan shape which is four inches wide at the end of the fan. The wires are held in place by a piece of ¾ x 2½-inch water pipe which fits over the end of the wooden

handle. The wires are evenly spaced in the opposite end of the pipe which is flattened out to hold them in place. This brush was made and used by a neighbor grower with very effective results.

Much of the speed is sacrificed with this whisk broom over the brush broom at the expense of accuracy. Its effectiveness is shown in the records.

Thinning may begin when the petals reach the early balloon stage, and may continue for a day or two beyond full bloom.

Less damage is likely to occur to the leaf buds from this broom over the brush broom which is used in a downward sweep. The whisk broom is moved with an upward stroke, or is brushed along the branch from the base outward. Every twig must be brushed. The brush is so easily handled that bud distribution can be accomplished with a fair degree of accuracy.

The time element is a factor limiting the use of the whisk broom. In our section the temperature rose to eighty degrees last March 15 and 16. The high temperature these two days caused considerable swelling of the bud, but not sufficient to permit brushing. No appreciable swelling occurred after that until March 25. On this date the temperature again rose to eighty, and the first blooms began to open. For three consecutive days the temperature reached eighty and the trees were in full bloom on March 28. I had planned to brush thin with the broom in the full balloon stage. There was but one day between the balloon and full bloom. The leaves were then so far advanced it seemed hazardous to undertake brushing. My neighbor, however, brushed quite a few trees with the whisk broom. The work was done by a crew of teen-age negro boys on a piece work basis. Four cents per tree was the rate set for five-year-old trees, six cents for eight-year-olds and eight cents for fourteen-year olds, or the largest trees. The boys averaged ninety trees per day in the five-year group, fifty-five eight-year-old trees and forty-five of the oldest trees per day. The thinners were able to make a fair wage on this basis and the grower accomplished a considerable part of his thinning at a very low cost.

It was necessary to go back over all of the brushed trees and break up clusters. This was done with the rubber hose at an average cost of four cents per tree for all ages. The hose thinning was done by the war prisoners on an hourly basis. The total cost of thinning then amounted to eight, ten and twelve cents per tree respectively.

The effectiveness of this method was found in the packed fruit,

which in the final analysis measures the worth of all orchard operations.

Seventy-one per cent of the fruit sized out two inches and up and twenty-nine per cent packed one and three-fourths minimum.

In the final packing ninety per cent made two inches and up, and ten per cent packed one and three-fourths min. The difference in size of the peaches in the first and last picking is due to harvesting the fruit in a green and immature condition in the first picking.

This is an enviable record for size in a year when growing conditions were none too favorable.

In orchards of extensive acreage it seems that the brush broom and hose method of thinning would be an ideal combination. It is unquestionably the speediest method of thinning, and there is no reason why proper spacing cannot be realized with constant supervision in the orchard.

"Any Fool Can Grow Tomatoes"

Condensed from The Southern Planter

H. A. Hunter
University of Maryland

I've heard the statement, "Any fool can grow tomatoes," a good many times in some twenty years of working with this crop for commercial canning. And it's almost true! Even inexperienced Victory gardeners generally have better luck with tomatoes than with most other crops.

But very few growers are getting the most out of tomatoes, or even approaching the limit of profitable production. Why? Well, tomatoes just aren't like most other crops in their response to good treatment. There is a limit as to how far one can profitably go in fertilizing corn, or even fattening a steer. But the response of the tomato to good production practices is almost unlimited. Compare the average state yields of 3.3 to 4.0 tons per acre in the commercial canning areas with yields of 10 to 20 tons commonly made on large acreages by the better growers, or with yields of 35 or more tons which have been obtained under experimental conditions.

The following suggestions on what I think are practical means of increasing the dollar-and-cent profit from tomatoes are intended primarily for the canning crops growers, but apply in large part to the fresh-market producers as well. Of course the gardener, with his "spoon-feeding" methods, should go far beyond the standards set here.

The two most important natural factors in growing tomatoes are weather and the natural fertility of the land. The weather influences the set of fruit, the amount of cracking and rotting, and the disease and insect injury, as well as the growth of the plants. No artificial fertilization can entirely overcome the effects of a poor soil. It is only good common sense, therefore, to select one of the best pieces of land on the farm for a crop in which so much money and labor are invested.

The amount of organic matter largely determines the value of the land for tomatoes. A good clover sod, supplemented with 15 or more tons of manure to the acre, is usually considered the

Reprinted by permission from The Southern Planter, Governor Street, Richmond, Virginia, March, 1945

best bet for a good start towards a bumper crop. The use of green manures and cover crops in the rotation helps to maintain the organic matter of soils. And by the way, why not fertilize these crops? Isn't it reasonable to expect they would produce more if fertilized. We have found that it pays well.

Tomatoes do not need a particularly "sweet" soil, but lime should be applied if it is needed in the general rotation or if soil tests show a deficiency of calcium or magnesium. A lot of our soils show an increase if lime is plowed down rather than spread on top and worked in.

The proper use of commercial fertilizers probably offers the best means of increasing tomato yields. The average amount used is far too low. Many growers feel that 500 to 800 pounds per acre is the maximum that they can use without "burning." But most of the 10-ton growers in this area use 1,000 or more pounds year in and year out. Before the war, quite a few of the best growers used up to 1,500 pounds, regularly, and some even used a ton.

A 10-ton yield of tomatoes absorbs from the soil approximately the following amounts of the principal fertilizer elements.

Nitrogen	100 lbs.
Phosphoric acid	35 lbs.
Potash	175 lbs.

The amount of phosphorus used is relatively small but a greater quantity must be added because a large percentage is tied up in an unavailable form when it comes in contact with the soil.

The application of 1,000 pounds per acre of a 4-12-8 fertilizer adds the following:

Nitrogen	40 lbs.
Phosphoric acid	120 lbs.
Potash	80 lbs.

This is about half enough nitrogen and potash for a 10-ton crop. Add 10 tons of manure and we have barely more than is required, and this isn't discounting that which will be lost by leaching. So the 500-pound application just doesn't fit in. At the present time War Food Administration limits the amount of fertilizer for tomatoes. The maximum is 1,200 pounds per acre in Maryland.

In experiments in Maryland, the best method of applying moderate amounts of fertilizer for this crop has been in bands 3 to 5 inches to each side of the row and about 4 inches deep with fertilizer attachments on the transplanter. Very few growers have such equipment at the present time, but a similar method is frequently used in which the fertilizer is applied in bands with potato planters and the plants are set by hand between the bands.

Another method which has shown up well in experiments and

has been used to a limited extent under field conditions is the placement of the fertilizer in bands in the bottom of the furrow with attachments on the plow. Applying the fertilizer on top of the ground and plowing it under has given as good, or a little better, results than drilling the fertilizer after fitting the land. Broadcasting and discing the fertilizer in has always given lower yields than the above methods.

We just don't mention putting the fertilizer in the row below the plants. It can be done, but the danger of burning in dry years is so great when a fair quantity of fertilizer is used that we are afraid to recommend it at all.

The yields shown below as tons per acre of U. S. No. 1 and 2 tomatoes were secured for the different methods of application in recent tests at College Park and at the Ridgely Substation:

	College Park	Ridgely
Disced in		4.07
Drilled	9.77	5.50
Plowed under	10.69	6.33
In furrow	11.30	7.25
Bands	12.44	7.31

Most of the fertilizer for tomatoes in Maryland is either drilled or plowed down. Plowing the fertilizer down is a very convenient method of application and certainly gives good results under field conditions when the larger amounts are used. Having some of the fertilizer down as deep as the plow depth is supposed to result in greater drought resistance. When the fertilizer is drilled on after fitting the land, it should be put down 3½ to 4 inches deep. If it is drilled shallow, later workings will mix the fertilizer with the soil and result in lower yields in the same manner as broadcasting and discing.

Theoretically, side-dressing of fertilizer after the plants begin to draw heavily on the plant food should give increases, particularly on light, sandy soils. We have been unable to show this in our tests, but possibly one reason is that we have generally used soils somewhat on the heavy side.

The fertilizer analyses are limited by regulation of the War Food Administration. Those which may be used in Maryland this year vary from a 4-8-12 for sandy soils to 3-12-6 for the heavier soils. Grades for intermediate soils are 5-10-10, 4-12-8, and 5-10-5. As previously stated the maximum allowed per acre is 1,200 pounds.

Every grower who uses a transplanter should use a starter solution. Starter solutions are simply soluble fertilizers dissolved in water. They are useful in helping the plants survive the shock of transplanting and in getting them off to a quick start.

Their use is to be recommended particularly when the commercial fertilizer is not placed close to the plant. When sufficient plant food is available to the plant from the time of transplanting, starter solutions give no increase. In our trials, we have had increases only about one year in three, but the cost of the material is so small that occasional moderate increases in yield will pay for its regular use.

Most fertilizer companies now supply starter mixtures and it is probably better for the average grower to use these ready mixes than to attempt to mix his own. Regular commercial fertilizers can be dissolved in the transplanting water at the rate of about 5 pounds to 50 gallons of water. A convenient method of mixing large quantities is to dissolve 50 pounds of the fertilizer in a 50-gallon barrel of water and use 5 gallons of the solution to 45 gallons of water in the transplanter tank. Do not use the insoluble fertilizer which settles to the bottom.

Good plants, set in the field early, mean a lot towards getting a bumper crop. Good, stocky plants, 8 to 10 inches tall, and free of disease get off to a quick start if the weather is at all favorable. Conditions early in the season are frequently more suitable for the plant to become established and develop a good root system. Then, when the weather warms up, the plant develops fast and sizes up a good part of its fruit before the extremely hot weather of midsummer.

Early planting in many commercial areas means the use of hotbed or Southern-grown plants. Good, early, home-grown plants usually give the very best results. But, unfortunately, most tomato growers are not good plant growers, as far as the management of hotbeds and coldframes is concerned. But what about Southern plants after the heavy collar-rot infection of last year? Anyone who has been burned tends to steer away from the fire, but the chances are that heavy collar rot won't occur again on these plants for some years. If we could definitely get away from collar rot with home-grown plants, then I would say forget the Southern plants and grow your own early plants. But we do get collar rot on our own plants when weather conditions are right for the disease.

Our own Southern plants last year looked perfect when they arrived, but they were badly infected and collar rot developed right after they were set. We had to replant 35 per cent of them. But even so, they outyielded our home-grown plants set 17 days later. Here are the yields:

	Yield Tons per acre
Southern plants	13.13
Home-grown plants	11.67

Practically every test we have run over a long period of years shows decreasing yields for the later plantings after the early safe planting dates. With good early plants, the differences are usually greater than shown above.

Under present conditions of good prices, there is profit in even late tomatoes. With the Government begging for food production, one way of handling a larger acreage with limited labor and materials is to plant part of the crop early and the rest later. A spread of two weeks in planting means that about 20 per cent more acreage can be handled at the peak season with the same labor. With prices at the present level, this is not only the patriotic but, also, the profitable thing to do.

In raising home-grown, open-bed plants, start with state certified seed. It's the cheapest insurance you can get. Certified seed has probably been treated. If not, it's a wise precaution to treat them yourself. Your local hardware or seed store probably has a material with directions for treating. Don't crowd the plants in the bed. Crowded plants will be soft and spindly, subject to collar-rot and leaf-blight infection, and they rarely get off to a quick start in the field. It's definitely cheaper in the long-run to make a larger bed and sow the seed thinly. Don't cultivate or pull the plants when they are wet with rain or dew. That's a good way to spread diseases.

In transplanting by hand, try to pick a time when there is ample moisture in the soil, and a cloudy day helps a lot in getting a good stand. Planting in the afternoons, only, is a good practice, particularly on sunny days.

Most growers tend to plant a little too close, with the thought, "You can't get 'em if you don't put 'em there." That's not as true with tomatoes as some other crops, because an individual tomato plant will produce up to any reasonable limit of plant food it can get. Standing 4 feet by 4 feet is good average practice. A good many growers are now planting closer in the row with rows farther apart, such as 3x5 feet. The vines in the wider rows are not torn up so badly in the early pickings, and this helps to cut down the early infection of leaf blight.

Tomato growers are always interested in new varieties. My advice is not to go "whole hog" for the new varieties until you have tried them out pretty thoroughly with your old ones. At the present time, Rutgers is used almost exclusively for canning on the

Eastern Shore of Maryland and to a large extent in Western Maryland. Marglobe is next in importance and does well on highly fertile soils. Greater Baltimore and a few others are used to a very limited extent. Pan America, a relatively new variety, is highly resistant to Fusarium wilt and may well be used where wilt is bad. It has not yielded as well as Rutgers or Marglobe where wilt is not important. A new variety, Garden State, developed by Campbell Soup Company, will be available this year. Our results last year, in comparison with Rutgers, were as follows:

	Yield Tons per acre
Rutgers	11.38
Garden State	12.22

It makes a rather compact vine growth and shades the fruit well, cutting down on the amount of sun-burn. For the same reason, it is a little harder to pick early in the season. It looks promising enough for a trial.

Cultivate tomatoes to control weeds and to break up crusts after rains. Cultivation may be deep at first, but after the feeder roots get out in the middle of the rows, and that isn't so long after the plants really begin growing, cultivation should be very shallow. This is particularly true if the fertilizer has been drilled fairly shallow. The principal reason for cultivation is to control weeds. Catch them when they are small and shallow cultivation will do the job and won't cut too many roots. You can't drive roots down by cutting them off!

Tomatoes should be picked fairly often for best yields. Once a week or every 10 days may be often enough during part of the season, but when they begin ripening up fast it is well to get over them more often. Ripe tomatoes begin to rot fast, particularly during wet weather, and a heavy load of mature fruit seems to prevent proper sizing up of the young fruit.

And now, just one more shot about the use of fertilizer. If you have done a lot for your tomatoes, otherwise, don't think that you can afford to cut down on the cost here. I wouldn't recommend the use of a lot of fertilizer on poor, light soil that is to be planted late with any kind of plants. I think it would be wasting money. But the fellow who has good land, rich in organic matter, and is doing a bang-up job in every other respect is missing a lot, in my opinion, if he doesn't use close to the 1,200 pounds allowed.

Tilt the House, Save More Pigs

M. Glen Kirkpatrick

A KENTUCKY hired man gave me his thoughts on a new swine raising practice in these words:

"This hog raising business gets harder to understand, the more I learn about it. Boss used to tell me set the hog house level when sow's goin' to have pigs. Now he tells me be sure to tilt one end up, so old sow won't mash 'er pigs. Boss, he says it pays off, though."

What this lover of pork chops was talking about is the tilted farrowing house, which is a new idea for most hog raisers. But new as it is, it is becoming popular very fast with hog men in the Bluegrass State.

That's because, as the hired man told me, it "pays off." You can see what that means from the following experiences of hog raisers.

In Hancock county Harvey Thrasher sold a litter of nine spring pigs whose average weight was 234 pounds a head when they were 168 days old. Another batch of nine pigs averaged 231½ pounds when 162 days old.

These two litters were farrowed in tilted houses; that is, houses with one side higher than the other, so that the floor is sloping instead of level.

What's the idea of the sloping floor? Well, it helps to keep the sow from lying on her pigs and mashing them.

Here's how it is. Along the lower wall of the tilted house a pig hover is placed. The sow lies with her back up grade, and the little pigs make their nests along the wall beneath the hover, which helps to keep them warm and prevents overlaying.

The hover is about 10 inches from the floor and extends out about 12 inches from the wall. Very little bedding is used; if much is used, it works down under the hover and clogs the space for the pigs.

Let's go back now to Mr. Thrasher's experience for just a minute. Not one of the pigs in tilted-house-litters was mashed; losses in other Thrasher litters farrowed on level floors were as high as 25% of pigs farrowed. To get "tilt" into his farrowing houses he had to put old posts under one side of the house, because there was no slope to the ground.

Where did this tilted-house idea come from, anyway? It or-

iginates with the swine specialists at the University of Kentucky. They included it in their leaflet of directions for swine, published last spring. "Results are best when the floor slopes about 1½ inches to the foot" the leaflet says.

Wherever the sloping floor farrowing house has been used as recommended, losses of pigs from overlaying by sows have been greatly reduced. Losses on tilted floors have averaged only one out of 50 pigs. Without exception, farmers using sloping floors have reduced losses due to overlaying.

Farmers who keep mature sows for their pig crops are the ones who can see the most promise in the tilted house idea, because the heavier sows are awkward and are likely to mash more pigs.

The tilted house idea has crossed the Ohio river into the Buckeye State, and is giving good results there, too. Some farmers are hesitant to try it because it is different from anything they have done before, and they are afraid neighbors will laugh at them. What if they do?

Grow Your Own Feeds

Condensed from The Shorthorn World

Prof. D. J. Kays
Ohio State University

THERE are two separate appeals which the business of breeding purebred livestock has for the participant. First, there is the joy and satisfaction which one gets from the ownership of fine animals. Let us call this the romantic appeal of the business. Second, there is the financial aspect. Let us call this the economic appeal of the livestock business.

While the financial phase of the livestock business is of primary importance, he who seeks financial profit alone, even if he meets with success from the financial standpoint, will, after all, have missed one of the greatest satisfactions that is to be derived from the ownership of good livestock. Fine animals are to be commended not only for what they are as individuals, but for what they represent and for the good that they are capable of doing.

There is no other form of property in the possession of which one can take more pardonable pride than in the ownership of good livestock. No one will take his friends to a bank to inspect the money, stocks or bonds inside a safety deposit box. But, he can ask the same friends to join him on an inspection trip of box stalls, pastures and paddocks, without danger of indictment on a charge of egotism or undiluted self conceit.

But, the livestock business also has an economic phase, emphasis on which is absolutely imperative, if the business is to endure, because, the livestock business, like any other business must be both productive and profitable, if it is to be permanent.

At Ohio State University, the Department of Animal Husbandry is attempting to train students in the production of meat and milk and wool. All of these products are animal products, the production of which require immense quantities of feed. In the introductory chapter of a recent textbook, the author states that seventy percent of the crops grown in this country are marketed on foot. This statement stresses the economic inter-relationship of land and livestock. It

Reprinted by permission from The Shorthorn World, Aurora, Illinois, Feb. 25, 1945

is almost as impossible to farm successfully without livestock as it is to own, breed and feed livestock without a farm. The good livestock farmer is continuously feeding and enriching his soil by returning the manure from the crops to the land. Too many grain farmers are still robbing the soil by cropping it continuously and then hauling said crops to town where they proceed to dump the fertility of their land down an elevator chute.

It is not sound practice to buy high priced mill feeds in quantity and try to market them successfully in the form of livestock products, if your plan is to run said feed mills through the digestive tracts of farm animals which furnish a slow turn over. Thinking in terms of money turn over, dairy cattle are first in quickness of turn over, hogs are second—sheep are third—beef cattle are fourth—horses are last. The dairy cow provides a daily turn over in milk receipts. Brood sows can have two litters per year and the pigs can be marketed at six to eight months. Lambs can come in January or February and be marketed in June or July. With beef cattle and horses, the turn over is slower.

Let us be specific for a moment. In 1940, a requisition was placed on my desk requesting the purchase of some commercial calf feed which is advertised widely as an incomparable feed for use in fitting beef calves for show. I called a local feed dealer and they quoted this particular feed at $119.00 per ton. I refused to O. K. the requisition for this calf feed, because I could not endorse the practice of running any kind of feed, priced at $119.00 per ton through the digestive tract of any kind of beef animal.

I believe that nurse cows as a source of feed in fitting beef calves for show should get the call over a commercial feed that costs $119.00 per ton. There are two reasons why the nurse cow should get the call. First, there isn't any real substitute for milk in growing beef calves and fitting them for exhibition. Second, I believe that pasture grass, legume hays, silage and forage crops will make nurse cows give a lot of milk which beef calves can convert into beef more economically than any commercial mill feed that costs $119.00 per ton. Such prices are prohibitive. In 1941 at the Chicago International Ohio State made the best record they've ever made with their livestock. In the fitting of these entries, a number of which figured in the championships at the International, maximum use was made of home grown feeds and a minimum use was made of purchased mill feeds. In other words, home grown feeds will not only maintain the breeding herd in

good rig, but home grown feeds will also go a long way toward fitting cattle for show.

Commercial feed men for years have tried to sell us commercial mixtures to feed our draft horses at Ohio State. I have never purchased commercial mixtures as feeds for our horses. I believe that horses, which furnish the slowest money turn over of all farm livestock, should be maintained on farm grown feeds. So, all through the years we have stuck to crushed oats, mixed hays and the legume hays as the chief feeds for our horses. Of course we have purchased some bran and a little oilmeal when fitting horse entries for show. But our policy in choosing maintenance rations for brood mares, stallions and work horses has been to use the home grown feeds. We have raised what we have fed. We have fed what we have raised.

Feed and labor are two of the biggest charges in connection with any kind of a livestock project. At Ohio State University in the Department of Animal Husbandry, these two items have to be watched constantly, if the receipts from the sale of livestock and livestock products are to cancel the expenditures for feed and labor. Our feed bill in 1941, the last year we patronized the shows, was approximately $30,000. In 1942, when we stayed home from the shows and made maximum use of pasture grass, legume hays, silage and forage crops, our total feed bill, for approximately the same livestock population was only $24,000. We were in a position to make minimum use of high priced commercial mill feeds and maximum use of farm-grown feeds. The result was a $6000.00 reduction in our feed bill.

We stressed pasture. On March 20, 1943, we turned into adjoining patches of barley, 4½ acres and rye, 2 acres — 125 head of ewes and lambs. These sheep were left on these two patches of forage until May 25, 1943, a little more than two months.

Into a patch of oats and rape (two acres), 180 ewes and lambs were turned June 27, 1943. After two weeks of intensive grazing, this two-acre plot was rested eighteen days. Then after weaning our lambs, July 28, 1943, we turned 100 head of weaned lambs into this patch of oats and rape for two weeks. Then they were turned into a ten-acre plot where the seeding was a mixture of timothy, alfalfa and brome grass. The grazing season was very favorable because of adequate moisture and these lambs remained on this ten-acre plot of mixed grasses until November 2, 1943.

After utilizing the 4½ acres of barley and the two acres of rye which carried 125 ewes and lambs from March 20, 1943, to May 25,

1943, these two plots were replowed and reseeded to Sudan grass.

We have fourteen head of dry beef cows running on eighteen acres, consisting of six acres of third cutting alfalfa, six acres of corn land from which the corn has been husked by a mechanical picker and six acres of wheat stubble aftermath. They have been on this twenty acres for two weeks and the plan is to leave them there until the first or the middle of December.

The hay loft at our main beef barn has an ample supply of good hay and back of the barn is a hay stack to which the beef herd will have access during the winter and around which they will find shelter. There are two silos at our main barn, one of them filled with corn silage, the other filled with grass silage. The plan is to carry the herd through the winter on silage and hay, with a minimum amount of grain and mill feed.

The above comment concerning sheep and cattle is typical of the way in which we are handling all of our livestock — Dairy Cattle, Beef Cattle, Sheep, Swine and Horses. We are making maximum use of permanent pasture, legume hays, silage and forage crops in the maintenance of our herds and flocks. We are raising all the feed we can. We are feeding all we raise.

Steps Take Time

Condensed from Poultry Tribune

Louis M. Hurd

Cornell University

Did you ever keep track of the distance you travel and the time it takes to do the daily chores in caring for your laying flock? Do you know what proportion of your time is spent in gathering eggs, feeding, watering, or cleaning?

I think if you kept a record of these things for one day you would be surprised at the results.

In May, 1944, as a part of the Farm Work Simplification Project, Dr. I. R. Bierly and Dr. L. B. Darrah, from the Department of Agricultural Economics, Cornell University, and myself made such observations on eight poultry farms in central New York. We arrived at each of these farms just before the work of caring for the flock started for the day, and we followed the owner or his hired man around while performing every single operation on the farm during the day.

The surprising thing was that on one farm the chores did not begin until 9.30 in the morning, while on another farm the work began at dawn or 6.00 A.M. Apparently, on a poultry farm the chores do not have to begin at any stated time as is usually the case on a dairy farm.

The time when the work begins depends a great deal on the organization and management of the poultry enterprise. In much the same way, the travel and time spent and the difficulties of the work vary according to the amount of thought and good management which goes into the planning of the work. Of course, some of this may be affected by the amount of capital which a man has available to invest in equipment to improve the method of doing some of the tasks. However, when you come to follow different men around their premises and see the way in which they do the comparable tasks, it is easy to see where short cuts can be made both in travel and in the time of doing an operation.

In making the observations on the length of time required to do certain chores stop-watches were used by the observers which measured in one-hundredth of a minute. The observer in each case carried a clip-board with the stop-watch fastened to one corner. When the caretaker started

Reprinted by permission from the Poultry Tribune, Mt. Morris, Illinois, March, 1945

out, the observer would mark on the sheet the time and place where the start was made and indicate the time and place of every single operation of the caretaker in following out the particular chore he happened to be doing. At the same time, the distance traveled from point to point was estimated and jotted down.

On the most efficient farms, the caretaker performed two or more tasks on the same trip. For instance, one man filled the drinking fountains from an overhead faucet while gathering eggs. On another farm, the men fed grain, turned on water, and opened the nesting compartment doors on the same trip, thus eliminating travel. Considerable time and travel can be eliminated in the pens by the arrangement of nests, feeders, and roosting equipment. It is surprising how little contrivances about the windows, doors, feeders, nests, and watering devices help to eliminate work and time.

On one farm, I well remember the arrangement of the nests. The pens were large; one of them as large as 36 x 39 ft. The entrance door, in this instance, was in the corner. There were three nest sections in this pen near this door, but one in the opposite corner. Because of the arrangement of the feeders and roosting tables, the caretaker had to walk around them diagonally across the pen to reach the nest section in the farther corner. This meant that he traveled a distance of approximately 110 feet before he got back to the three nesting sections near the door. There was no good reason why the nest section in the farther corner could not have been placed near the door and, in this way, have eliminated 110 feet of travel each time the eggs were gathered. Since this man gathered eggs three times a day, a change in arrangement would have meant a saving of 330 feet per day, or 22½ miles in a year.

Still further saving in travel and time could have been made in the same pen by a different arrangement of the dry-mash feeders. Instead of placing these feeders at different angles with the front wall, or at right angles to it, travel would have been saved to place these feeders as much as possible in one continuous line parallel with the front wall.

Another place on this farm where travel and time could have been eliminated was in regard to the method of supplying water. Although water was piped into the pens, and it was possible to draw it from a faucet, still the drinking containers were located for the most part about 15 feet from the water supply. On this basis, the travel in carrying

water to the water trough in each pen (and there were several pens) amounted to 70 miles per 1,000 hens, yearly. If the faucets supplying water in the various pens had been located over the drinking fountains, many of these 70 miles of travel would have been eliminated.

In a great many poultry houses in New York State, the operator has arranged to bring water to the pens and, in some instances, has an automatic supply during the warmer months of the year. But, to avoid the possibility of freezing the pipes in the winter, most of these men have arranged to drain the water pipes during the night, or at such times during the day when water was not needed. This means that during the cold months when the houses are most likely to be fully stocked, the work of supplying water is greatest. On one farm where such conditions prevailed, the operator during the winter traveled 3,200 feet a day per 1,000 hens, or at the rate of 220 miles yearly. Proper insulation of the house or the use of soil cable with some insulation would make it possible in a great many such instances to have an automatic water supply during the winter, as well as in the summer, thus eliminating considerable travel.

A handy method of disposal of the droppings and litter in a poultry house is another place where considerable time and hard work can be eliminated. On some of the farms with the best set-up, holes in the floor near the pit or droppings board, or chutes out through the side wall, at conveninent locations, eliminated much hard work and time.

To show how time-consuming this job may be, if the arrangements for removing the manure from the droppings board are not well planned, I recall one place where observations were made. This man removed the droppings by means of a wheelbarrow while we kept track of his movements and the time it took to do this work in one pen.

We followed him through the outside door with the wheelbarrow. When he came to the door between two pens there was a board on the floor in the door opening which had to be removed before he could enter with the wheelbarrow. To prevent the hens from going through the opening while the floor board was removed, the operator nailed a piece of board to the bottom of the door.

On the inside of the pen there was a board running lengthwise of the pen on the floor to keep the litter from being scratched to the back of the pen. In order to approach the droppings board, the operator had to go around or lift the wheelbarrow over this board.

There was a screen over the

droppings which was nailed to the droppings board. This screen had to be unnailed and braced up with a stick before the operator could begin his work of cleaning the droppings board. Upon completing the work, the screen had to be nailed back to the droppings board, the wheelbarrow pushed around the baffle-board on the pen floor, the board on the door removed, and the footboard for the door put back in place before the man left the pen.

It is quite easy to see that an operation of this kind, where the set-up is not convenient, is a great time-consumer. Many workers do not realize this unless they take the time to analyze their operations. Some farms are very efficient in some operations and inefficient in others.

In tabulating our observations, we discovered that the operation of gathering the eggs and taking them to the egg-room took one-third more time than the combined work of feeding mash and grain. Of course, this is only a part of the work of preparing these eggs for market. On most farms where observations were made it took from 6 to 10 minutes to clean and pack 100 eggs. This does not include the time used in preparing the cases for use.

It is easy to see, therefore, that these operations of gathering, cleaning, grading, and packing the eggs need careful consideration by any flockowner, as this is the place where considerable time is expended. Much travel can be eliminated by arranging the nests in large pens near the entry door or by having a nesting room near the point of entrance. In a similar way, having the egg-cellar or cooling room under the laying house or near the laying house, cuts down travel and time.

On one farm, following a suggestion made by the observers, the operator was able to make a change in the arrangement of the grading and cleaning apparatus, so that 21 percent less time was taken in cleaning and packing one basket of 160 eggs.

On the basis of our findings in these observations, the average time spent in gathering, cleaning, and packing a case of eggs was 57 minutes, or about one hour.

The average amount of time spent on these eight farms in the daily routine of work amounted to 73 minutes per day for 1,000 birds. The average amount of travel per 1,000 pens daily on these farms was 4,810 feet, or almost a mile. As a matter of fact, there was a great deal of variation in the length of time taken to do the chores for 1,000 hens. The smallest amount of time was 20 minutes per 1,000 hens, as compared with 111 minutes on another farm.

In regard to distance traveled, the shortest distance was 1,700 feet per 1,000 hens, as compared with 7,810 feet where the greatest distance was covered.

I think that one needs to be careful, however, in considering ways to save steps in caring for a flock that it is not carried to the point where unfavorable results in production are likely to result.

There is a difference between taking time, for instance, to feed wet mash or pellets and the best floor arrangements of the feeders. Feeding the wet mash—although it takes more time and travel—may be a necessary operation to increase production, while a better arrangement of feeders saves time and travel without necessarily affecting production.

Similar comparisons might be made about other parts of the flock management. In other words, there may be some time-consuming operations in the pen that will be well worthwhile when measured in terms of production.

That Rascal, the Crow

Condensed from Farm Journal and Farmer's Wife

Joseph W. Lippincott

His wing spread is over three feet; his blackness makes him show up like a sore thumb; he's noisy; he isn't protected by law. But need he worry? Certainly not. He invades the whole countryside at dawn, and takes first crack at nearly everything edible. Whoever outwits him is smarter than a crow. Not many of us ever do.

Is he friend or foe to farmers? For years I have watched the feeding habits of tamed crows, and opened the stomachs of hundreds of wild birds.

I have found that they look first for eggs, meat and fish, second for fruits, third for wheat and for corn in the milky stage, next for oats, hard corn, barley, peanuts and soybeans. Only when such foods are unobtainable do they seem to hunt for insects and various kinds of worms. Gluttonous young crows are much less interested in a mixed diet than the old ones.

The amount they will wolf in a day is astonishing—greater than their own weight. One stomach that I examined at 7

Reprinted by permission from the Farm Journal and Farmer's Wife, Philadelphia, Penna., March, 1945

a.m. contained 134 grains of wheat, with six grains of corn piled on top for good measure; another, 18 cherries.

Taking the stomach content by seasons, my records show that in winter the crows live mostly on corn, fresh water snails and garbage; in spring on corn, sumac berries, cherries, mulberries, eggs, small birds, mice, young rabbits, measuring worms, beetles, and earthworms; in summer on wheat, corn, eggs, cherries, pears, apples, and grasshoppers; in autumn on corn, wheat, tomatoes, apples, cabbage worms, and berries.

Countless other foods are eaten when they can get them. After freshets they find dead fish along streams and lakes. Also, they catch a few small live fish, frogs, eels, tadpoles, snakes, lizards and crayfish. Early in the spring they sample a small number of green things. Some have the luck to beat the buzzards in finding dead animals.

It might be asked whether, in view of such dainty feeding habits, the crow himself is good eating. My answer would be that he can be eaten.

I tried it once. I plucked the feathers from a nice young crow, fresh out of the nest. He was boiled nearly an hour, then broiled. Chewing gum softens up after ten or fifteen minutes of good hard work with the jaws, but not crow, nor does crow meat lose a very peculiar flavor. I have not tried any more.

In May, when the 4 to 6 young ones in the nest are squawking for food, I have seen two crows pursue and kill a full-grown pigeon, and two others kill an old flicker. I have seen them carry off young ducks, little chickens and countless eggs.

When a hen is guarding her chicks, one crow will alight near her on the ground, sidling about like a good friend of the family, or like any old rooster, until her fears are allayed. Then he suddenly seizes the nearest chick in his beak and goes off with it in a hurry, while she vainly chases him. Then the second crow, who has been perching quietly nearby, swoops down and picks up another, sometimes two.

Small eggs are carried away usually in the crow's wide throat; hen, duck, and pheasant eggs by means of the beak, after a peck has made an incision.

The crow has no crop, and so puts everything directly into his stomach. There the juices digest food so rapidly, without the use of grit, that even hard grain is absorbed in half an hour, partly because he breaks up the kernels with his very powerful beak.

Chaff, bones, feathers, shells, coated seeds and other undigested materials which cannot pass through the small intestines, are

disgorged in conglomerate pellets.

Except in mating season, when he pairs off and, oddly enough, attempts to sing to his chosen lady, he is extremely gregarious. Flocks are small and local during a large part of the year, but in the autumn and winter when crows migrate from the north and forage widely in search of food, the flocks number hundreds, and at night gather together to roost by the thousand.

It is no simple matter to kill such a wary bird. If one crow sees you, he tells the world. His one great weakness is a fierce desire to join with others of his kind in harrying hawks, owls, cats and foxes. All a hunter need do is hide himself and imitate the raucous caws of a crow that has found one of these hated creatures. All crows within hearing will speed to join the attack, and, particularly if a stuffed owl or a burly old cat is placed conspicuously as a decoy, can be brought within easy gunshot.

Crows know that man is a late riser, and are much less on their guard in the early morning, when a gunner, who knows crow talk, can hide in the woods or in corn fodder, and bring in one after another simply by answering "here I am" when a passing crow asks "where are you?"

The age-old idea that to make a tame crow talk one must split his tongue is false. If he is taken from the nest in the pin-feather stage, he will be tame in a day or two.

One that I kept as a pet, called Caw Caw, learned to bark like a dog. Then he picked up short words such as "well," "hello," and "yes." Later he delighted in mimicking people engaged in conversation on our terrace. He would walk about among them, or perch, apparently in pious meditation, on the back of a chair, but in reality absorbing their chatter. After the guests had departed, he would hold mocking conversations with himself by the hour.

If wild crows flew over the house, he spoke to them with throaty caws. Just what insulting remarks he made from the safety of his windowsill I do not know, but invariably they took offense and circled several times to answer back. Sometimes the air would be black with the enraged birds, and blue with their raucous caw-cusses.

After that fun Caw Caw would go to uncover food that he had hidden in various flower beds. The dachshund also would be searching for these caches. The crow would follow him closely, and at the right moment seize him by the tail.

A furious battle would follow, the crow using voice, beak and claw. No amount of biting and pummeling could faze Caw Caw,

who would just shake himself and come back for more.

After breakfast the crow ate with noisy gusto from our hands until full to the neck, and then carried away and hid whatever was left over. He never hid two morsels in the same place. After a drink he would take a sopping bath in the large water dish, then overturn the vessels so that his enemy the dog could not share the water.

By that time he was ready to go wandering. Gracefully taking wing, he would sail to the cow barn to watch the farmer, and make remarks about his work. He always circled the hen yard to look for eggs, and then went to plunge his beak into tomatoes, melons, and even pumpkins, to see whether they were ripe.

Strawberries and raspberries he plucked by the hour, and hid after eating his fill; apples and pears he sampled one after another. If anyone tried to pick flowers, he would walk ahead destroying blossoms right and left, and if we hoed or used a spade, he thoroughly enjoyed getting in the way.

This perverseness was conspicuous toward people whom he disliked. My daughter undertook to punish him occasionally for his tricks, and against her he had a continual grudge. Sometimes he pecked and pinched her ankles with such force that he drew blood. Oddly enough, he acted the same way toward my mother-in-law, a very kind lady whom he forced to stay indoors.

With me, however, he was a constant friend, a real comrade. He met me joyously when I came home in the afternoon, and followed me closely everywhere about the grounds, uttering odd little sounds.

When he was still a fledgling I had experimented a great deal with his feeding. I placed tadpoles in his water dish and noted how he ducked his head under water to get them. I gave him lively frogs and mice to catch. I watched him try to penetrate the shell of a box tortoise, and to open clams.

One day I had three rats caught in separate steel traps back of the barn. The crow and I came first to a small one. The wily bird eyed it for a full minute, saw just how far it could reach, then walked right up and killed it with one swift peck.

The next rat was larger, but the crow finished him in the same way. The third was a monster, and boiling mad. At him the crow made several feints to test his reach, then cleft his skull.

Later I trapped an old woodchuck, but the crow took a good look at his bulk and teeth, and backed away with some side remarks in his own language.

His fighting ability was re-

markable, but one day in a battle the dachshund broke his wing, his leg, put out his right eye, and almost denuded him of feathers. I never saw a more doleful and morose bird, but he recovered and was soon spoiling for a return engagement. When the leg, which we bound in a splint covered with plaster of Paris, became infected, he saw the danger, and softened the plaster by standing for a long time in the water-dish, then picked and bit away the bandages.

I believe that while he was young and still growing, he ate at least three times his own weight every day. He could swallow two frogs or seven fat tadpoles in succession. He could eat the best part of a whole dead crow in about three hours, for he was a cannibal of the first class, and he could kill and swallow a garter snake two feet long.

His craving for meat often seemed insatiable. When he grew older he could eat half a rabbit in a morning. The wild rabbits and squirrels in the shrubbery he stalked with infinite patience, often coming within reach of their tails, but never quite managing to seize one.

His desire to acquire and appropriate for himself everything that he saw we valued would lead to his carrying away any article that he was strong enough to handle, such as silverware, gloves, compacts, ashtrays, pencils and tumblers. He pretended to be a teetotaler, and refused to drink any liquors, but would plunge his whole face delightedly into the glass and splash and bathe himself with the contents!

I often think of poor Caw Caw now that he is gone, and I miss the thieving noisy black rascal. Like all wild pets, he came to a sad end, for he insisted on sticking his nose into everything, and one day found a fresh coon hide which, to help preserve it, had been rubbed with poison and hung in the barn. Caw Caw's love of meat was his undoing.

Tractors Cut Corn Costs

Condensed from Nebraska Farmer

W. L. Ruden

Nebraska College of Agriculture

A LITTLE head work may save a lot of back work. When labor is expensive, a farmer may gain financially by doing a little planning rather than plunging too fast into the job ahead. For example, corn growers in southeastern Nebraska reduced the amount of labor needed to produce corn by substituting tractor power for horses, by listing in unplowed ground, and by adopting soil and crop improvement practices. Cost and yield records were collected in 1938 and from 1940 to 1943 by representatives of the Nebraska College of Agriculture. Yields were obtained by wagon box measure. The results are summarized in Nebraska Experiment Station Bulletin 370, entitled, "Cost of Producing Corn in Southeastern Nebraska."

The loess-drift hill area of southeastern Nebraska where the corn records were secured is a problem area from the standpoint of soil erosion.

Machinery records from Nebraska farmers show that two-row tractor cultivators and listers cover about two acres an hour. Horses with similar equipment cover only 1.4 acres per hour, on the average. In addition to being operated at a greater speed than is common with horses, tractor equipment frequently is wider than the common sizes of horse-drawn tools. According to five years of records, the combined effect of differences in type of power and width of equipment resulted in a labor requirement up to harvest time of 3.2 man hours per acre for tractor power, 4.6 for a combination of horses and tractors, and 6 hours for horses. Horses were used for husking in all instances. When compared as to the amount of time required to produce a bushel of corn, the comparison is 15 minutes for tractor power up to husking time, 18 minutes for horses and tractor power, and 21 minutes when horses were used for all operations.

Farmers in the area who use modern equipment and improved practices frequently grow 60 or more acres of corn. When the yield averages as much as 30 bushels per acre, they produced at least 1,800 bushels of corn.

Reprinted by permission from the Nebraska Farmer, Lincoln, Nebr., March 3, 1945

With that amount of corn, each minute saved per bushel means a saving of 30 hours per season.

Preparing the seedbed by plowing added approximately 5 cents to the cost and one minute to the time required per bushel in producing corn when compared with the practice of listing in unplowed ground. Plowing increased the yields a little, but not enough to offset the extra labor and expense. In some instances the plowing was justified even if it did cost more because the plow method was used to build and maintain terraces.

Labor conservation, in the long run, is closely associated with soil conservation. Listing corn up and down hill is very conducive to erosion. Seed and loose soil wash easily in lister rows that run down a slope. Erosion can be controlled on moderate slopes by a system of grassed waterways, terraces, and contour tillage. The terrace and tillage lines are laid to drain into the waterways.

Inasmuch as a good waterway is the backbone and terraces are the ribs that provide the framework of an adequate soil conserving system on rolling cropland, fertile soil is the source of "red blood" needed to produce high crop yields. Sweetclover that was seeded in small grain and carried over a second year for pasture or seed proved to be an excellent tonic for tired soils. In each of two years—1942 and 1943—corn land that had been in sweetclover during one of the preceding three years outyielded similar fields without sweetclover an average of six bushels per acre.

Not all of the difference in yields was due to the sweetclover. Corn growers who included that legume in the cropping system also were the most aggressive in adopting such practices as terraces and grassed waterways. Most of them also used some modification of contour tillage. It was impossible to determine just how much of the six-bushel difference in yields was due to the sweetclover and how much to the soil conversation practices. However, a further analysis of the records for four years showed that contouring alone, without being supplemented with soil building practices, such as the growing of legumes, showed no significant yield benefits in three years out of four.

Waterways and terraces call for hard work but pay big dividends. During the first two or three years a broad program of soil conservation may require more labor than exploitive farming. The jobs of constructing waterways and terraces and relocating field boundaries cannot be done without a lot of work. In a period of five or more years these measures should conserve labor as well as soil. Crop yields can be

increased on stabilized land as improved seed and cultural practices are applied. Increased yields, as long as they do not increase the labor requirements up to husking time, automatically reduce the time spent per bushel of corn produced.

Improved seed has increased labor efficiency in the past few years. Hybrid corn produced an average yield of 31 bushels per acre for five years. The average labor expenditure amounted to 17 minutes per bushel. Open-pollinated corn, under similar conditions, produced an average yield of 26 bushels and the time required per bushel averaged 20 minutes.

The foregoing material shows how a little mental work can save a lot of physical work.

Yam Drying Comes of Age

Condensed from Farm and Ranch

Ray M. Thompson

In 1793, Eli Whitney invented the sawtooth cotton gin which still gins over 90% of the snowy white balls in this country.

In 1795, Etienne de Bore finally succeeded in making good sugar from Louisiana cane. He cried out "It crystallizes!" and hardly had the echo of his words died out before the planters were turning from indigo—then suffering from a disastrous insect blight—to the raising of cane for the new American sugar industry.

These two crops have reigned supreme in the South for nearly a century and a half with their leadership unquestioned. Never was the yam—the tasty Southern sweetpotato—ever considered in the same rank as cotton and cane, that is—not until recently.

Suddenly 130,000,000 Americans were called upon to share the responsibility of war. The Fighting Front, the Production Front, the Food Front—each marshaled its forces and dug deep in its reserves of ingenuity.

The Army desperately pleaded for dehydrated foods, because every inch of our pitifully few merchant ships must be utilized to the fullest advantage. It was then the long ignored, almost nationally forgotten yam, enlisted for dehydration duty—a decision which marked the turning point in its own long, uneventful career, added a new cash crop to the economic life of the South, and pointed the way for a new coupling of agriculture with industry.

From the Warriner Starch

Reprinted by permission from Farm and Ranch, Dallas, Texas, March, 1945

Company in St. Francisville, Louisiana, early in 1942, went a 5-pound sample of the first dehydrated sweetpotatoes ever submitted to the Army. This sample was put through rigid tests and back came an order for a larger 2,000-pound sample shipment, which was given the taste test by the G.I.'s themselves. So successful was the reaction that the Army officially placed its initial order for 2,000,000 pounds.

The Warriner Starch Company immediately discontinued all starch production and went 100% into sweetpotato dehydration. It was not only the first but is today the largest sweetpotato dehydration plant in the world. Others, of course, followed. There are now five plants in Louisiana alone; fifteen throughout the balance of the South. The Army and Lend-Lease will require over 20,000,000 pounds this years.

Dehydration, like the ginning in cotton and the crystallizing in sugar cane, was the deciding factor that has transformed the southern sweetpotato from a local crop to a national one, in fact to an international food and industrial item.

One thing must be made clear. The southern yam and the northern sweetpotato are both sweetpotatoes, but there the similiarity ceases. The yam is soft and sweet; the northern variety has a different taste and color. In the northern sweet, when the meat is cooked, the sucrose in it remains sucrose. But in the southern yam, the sucrose breaks down into dextrose and other simple sugars.

The yam—so called by the southern negro from the original French word "igname" meaning good food and the appeasement of hunger—is indigenous to the whole South. The sweetpotato is the most important horticultural product in the South and second only to the Irish potato for the whole nation. But no southern state has ever concentrated on its native sweets as Maine and Idaho have on white potatoes. However, there is a great possibility that, after the war, Louisiana or even South Carolina may do this. As a human and stock feed, the yam stands high in nutritive value, having 17,200 international units of vitamin A—about 100 times more than the Irish potato.

Two important things have come to light since the yam's distinguished military record has focused the nation's attention on it. When three Louisiana plants, led by Warriner Starch Company, were recently awarded the War Food Administration's "A" Flag, it was learned that in Louisiana State University, at the head of the horticultural department, is the nation's leading au-

thority on the southern sweet—Dr. Julian Miller.

A New Variety

Several years ago, Dr. Miller created an entirely new and richer variety—the Unit One, Porto Rico. It was this variety that distinguished itself with the Army.

It took 16,000 different plant selections to develop the Unit One, Porto Rico. But Dr. Miller is still not satisfied. He has recently perfected a newer and still better southern yam, its skin and meat still a more golden color, so indicative of the richer carotene content. Not enough seed of this variety is yet available to make it widely known.

It was also learned that due to the demand for sweetpotatoes for dehydration, a new and closer relationship between local agriculture and local industry has sprung up. It is called "techno-agronomy" by the man who perfected its technique, Lloyd J. Cobb, owner of the Warriner Starch Company.

In order to procure more sweetpotatoes for his plant, Cobb went out and enlisted a whole parish of new farmers, right in the heart of cotton territory, to plant substantial acreage in sweetpotatoes. This was West Carroll parish in Louisiana.

He supplied them with good seed and helped them purchase the correct fertilizer, all of which they paid back from their crop. He also gave them the correct planting and harvesting procedure, worked out on the experimental farms of L.S.U.

But mainly he showed them how yams can be made a new 100% cash crop in the South. One third of the yams, the pick of the crop, will go to the fresh market at the highest prices. The second third, slightly less perfect, will be sold to the local processing plant for dehydration into human food—for the Army now, but for civilians later. This local plant will also can and quick freeze sweetpotatoes in the post-war era.

The last third, including the culls, jumbas, runts and bruised stock, will be processed into stock feed. And let it not be overlooked that sweet potato meal is one of the finest livestock feeds today. The South itself can use thousands of tons of it to support the cattle industry which it is rapidly developing.

For nearly 200 years the Southern sweetpotato has been unable to overcome a bad handicap. It will not last long, except under ideal storage conditions. It will heal a cut but not a bruise. These factors have localized and limited its potentialities. But dehydration and the coupling of local sweetpotato communities with local processing plants, which may become as widespread

as was once the cotton gin, have changed its future. It has given it the means of unlimited distribution in one form or another.

The yarn now faces a postwar demand for its nutritive qualities in dehydrated, canned or quick-frozen form for both human and animal consumption. And let us not forget its industrial promise as a source of alcohol, starch, pectin, vitamin A, plastics and many other by-products worked out in the laboratories of war.

A Farmer Looks at Alaska

Condensed from Successful Farming

Stanley L. Balloun
Animal Husbandman in charge, Fairbanks Experiment Station

THERE are three fairly well-developed farming areas in Alaska, and many other smaller areas where gardens and other small farming enterprises thrive. The three important areas are the Matanuska Valley, the Homer area on the Kenai Peninsula, and the Tanana Valley around Fairbanks. The Matanuska and Homer areas are both in the moderate temperature areas of southern Alaska, where winters are scarcely more severe than in the Midwest. The former is the most extensively developed of these two with good roads, schools, and churches and a well-rounded farming community. There is an extension agent to advise farmers, and 4-H Club work is available to every youngster. Palmer, a thriving little village in the Midwest, is the principal town in the Valley and supports a good high school.

The Homer area on the Kenai Peninsula is less extensively developed, but shows much promise. The soil is very productive here, with wild brome grass growing five or six feet tall. Land is available for homesteading in this area and some cleared and improved land is for sale at reasonable prices. At the present time, roads and markets are lacking but will undoubtedly be developed.

The Tanana Valley, with Fairbanks as the marketing and trading center, is a promising section and one ordinarily overlooked by people planning to come to Alaska to farm. This is the section to which we came last winter to supervise the United States Experiment Station at College. We were astounded at the similarity we found between the farming here and farming in Iowa. We found a fine herd of Holsteins, Hamp-

Reprinted by permission from Successful Farming, Des Moines, Iowa, March, 1945

shire hogs that would do credit to any Midwest farm, and Leghorns that cackled the same language my hens in Iowa had. The hay in the barn was much the same as that I've seen hundreds of times in Iowa barns; the oats, wheat, and barley were likewise familiar—tho heavier. On the other hand, we did not find Eskimos, igloos, ice sheets, or fish. No reindeer has hobnobbed with our cattle, moose have not wandered thru our dooryard, and dog teams have not been our sole means of travel.

All in all, after a few months of gradually becoming acclimated and acquainted, we find it hard to realize that we are so far from our former home. There are, however, certain striking differences that occasionally serve to remind us that we are living in a strange land. The beauty of the indescribable Northern Lights; the rapid growth made by garden plants in late June under 20 hours a day of sunshine; the characteristic "roughening up" of north-slope fields as frost disappears from the sub-soil, all bring home again to us that Alaska is indeed different.

The United States Experiment Station operated by the University of Alaska in co-operation with the Alaska Territory and the United States Department of Agriculture lies six miles west of Fairbanks, near College. The farm itself consists of 2,560 acres, of which about 200 acres are cleared and another 200 acres are used as timber pasture. All buildings that house livestock must be well insulated and provided with stoves for heat; otherwise, livestock is fed and cared for much the same as in colder areas of the Midwest. One advantage of interior Alaska is that there is scarcely ever any wind, and a temperature of 40 or 50 below zero actually affects livestock indoors less than a temperature of 10 below would with wind. On the other hand, livestock farming here has the big disadvantage of a long period of cold weather and much snow. The pasture season is very short and cattle must be kept indoors and fed usually from about October 15 to May 1. This, of course, increases labor and feed requirements.

Dairy farming is of prime importance in the Tanana Valley. There are two well-established dairies: Creamer's and Bentley's. Each of these farms maintains a heard of about 80 to 100 producers besides some young cattle. In neither case do they raise all of their own feed, finding it more profitable to devote time to milking and marketing rather than to the raising of grain. Neither do they raise all of their replacement stock. *It actually costs more to raise heifers here than to have them shipped in from the state of*

Washington. With milk valued at from 80 cents to $1.25 a gallon at the dairy, one can easily feed $40 worth of milk to a heifer calf in the first 30 days of its life. Later, this heifer will be fed hay valued at about $40 per ton and grain valued at about $100 per ton. In all, one can hardly keep the feed cost alone below $250 to $300 for the period up until the heifer brings her first calf. Good heifers, bred to freshen within a very short time after arrival here, can be shipped in at between $200 to $250 each delivered to Fairbanks.

There is no regular creamery or dairy market for bulk dairy products in this region. One must develop his own whole milk retail market, sell thru retail stores in Fairbanks, or market thru one of the dairies mentioned above. The city of Fairbanks, however, provides ample outlet for the milk produced by the dairies now operating and could absorb quite a little more without any danger of flooding the market. At present, the price of retail milk in Fairbanks is about 30 cents a quart for pasteurized milk.

Dairy farming in the Tanana Valley has been profitable and will probably continue to be so within limits. Some improvements will need to be made, however, to make for greater efficiency in the production of milk in order to compete successfully with dried and canned milk products. Standard feeds for cows here have been oat and pea silage; oat-pea hay; and mixtures of barley, wheat, oats, and mill feeds for concentrates.

We grow practically all the common Midwestern crops with the exception of corn. Oats yields well and is very heavy. Swedish Select is our best variety at present and by tests carefully taken, will weigh out between 40 and 45 pounds to the bushel. Yields here at the Station this year ranged from 30 bushels per acre on old hillside land to about 40 bushels per acre on newer land. Barley also does well and is grown as a substitute crop for corn in swine rations. Wheat does fairly well, matures safely, and is of good quality, but does not yield very well. From 10 to 15 bushels per acre is considered good for barley or wheat.

Poultry is kept successfully by many farmers and part-time farmers in the Tanana Valley. There are no large flocks, about the largest being the laying flock of 110 Leghorns on the U. S. Experiment Station farm. There is a place for more hens, however, in this locality. Feed prices are not extremely high when you consider that the price of fresh eggs in Fairbanks averages from $1 per dozen to $1.25. Storage eggs usually sell at about 70 cents a dozen, and many of the old-

time sourdoughs say they prefer storage eggs to the "tasteless" fresh eggs.

At the experiment station we are raising 48 spring and summer pigs and plan to keep about six gilts for next year's pig crop. We feed a little garbage from the college but most of our pork is produced on barley, wheat, and oats. There is no established market for live hogs and one must butcher all of his stock and sell privately or to the butcher shops in Fairbanks. Prices vary a great deal, but one can usually dispose of pork by the whole carcass at prices ranging from 30 cents to 50 cents per pound, depending upon quality. Incidentally, swine grow well here, there being practically no parasites or diseases prevalent in this area. We grow oats, peas, and rape in a mixture for swine pasture, and this provides excellent forage for the pigs from about June 10 to September 15.

Now what about land and land prices? One hears much about free land in Alaska—homestead land—and new land available for homesteading. I have talked to several men who came to Alaska thinking that they would take up a homestead near Fairbanks. In the main, these men have been disappointed. There is practically no homestead land available that is accessible by road within 16 miles of Fairbanks. There is plenty of free land in Alaska, but it is back in the timber away from established roads.

Practically all of the good virgin land is covered with a growth of spruce and birch and has a ground cover of about 4 to 10 inches of moss. In the dry, cold conditions we have here, there is very little decay of organic matter in the soil and this moss breaks down very slowly even when turned under.

As to improved land available for sale, there is land of such kind available, but it is not cheap. Land on gravel highways, at least partly cleared with no improvements of any sort, has been selling for about $50 per acre within a five-mile radius of Fairbanks. If there are buildings on the land, it may sell for $80 per acre.

The territory is full of success stories and they are not all of rich strikes in gold; many men have succeeded in farming and in business. It is hard, however, and there is no place in Alaska agriculture for the man who expects to make his fortune in a few years and return to the States to spend it. One must expect to battle such things as low fertility of the soil, long winters, low temperatures, and isolation. If he can successfully overcome these disadvantages, Alaska has much to offer him and an income beyond the realm of possibility for the ordinary farmer in the States.

Save Labor in Corn Growing

Condensed from Wallaces' Farmer and Iowa Homestead

Corn growing methods which leave out the mold-board plow got an Iowa test in 1944. Three types of seed-bed preparation, compared with plowing, indicated average power and labor savings of 20 to 30 per cent. Corn yields, with the new methods, went down 6 to 11 per cent.

The new, or partly new, methods of preparing the seed-bed for corn include (1) sub-surface tillage and surface planting, (2) disking and surface planting, and (3) hard-ground listing.

These methods have been compared with the common method of plowing and surface planting in a project handled cooperatively by Iowa State College and the USDA. Eight fields were used in Monona, Tama, Marion, Mahaska and Story counties.

Sub-surface tillage compared with plowing saved 15 per cent of man labor and 22 per cent of tractor horse-power hours. Corn yields, averaging all fields, both fertilized and unfertilized, were 56.5 bushels for sub-surface tilled compared with 63 on plowed land, a reduction of 6.5 bushels, or about 10 per cent.

Disking and surface planting reduced man labor 17 per cent and power requirements about 33 per cent. Corn yields on land planted after the disk averaged 56 bushels per acre, compared with 63 on plowed land. Yields were down seven bushels, or 11 per cent.

Hard-ground listing, which is new to most sections of the corn belt, reduced labor and power requirements most and showed best results in yield.

Listing corn reduced man labor 20 per cent and power requirements 42 per cent. Corn yields averaged 59 bushels per acre, compared with 63 on plowed land, a reduction of four bushels, or about 6 per cent.

As tillage methods may affect plant food available in the soil, fertilizer applications were made to half of the plots in each county on all four types of tillage. The fertilizer consisted of 200 pounds per acre of 5-10-5, applied with a corn planter attachment.

As an average of all plots plowed and surface planted in the old way, addition of fertilizer made no change in yield. Both fertilized and unfertilized plots yielded an average of 63 bushels per acre. All other types of tillage, however, showed increased yields with fertilizer.

On sub-surface tilled land, fertilizer increased the yield from 55 to 58 bushels per acre; on disked land, fertilizer increased the yield from 54 to 58 bushels

Reprinted by permission from Wallaces' Farmer and Iowa Homestead

per acre, and in listed corn, fertilizer pushed the yield up from 53 to 65 bushels, an increase of 12 bushels.

What do these results mean to the corn grower? Can the average farmer fit one of these labor-saving methods into his farming with profit? If so, which method is best for each of the various soils?

"Some of these labor-saving methods of growing corn have possibilities on most Iowa soil types," according to R. A. Norton and G. W. Browning, USDA soil conservationists cooperating with the Iowa experiment station.

Some questions need to be answered, however, for each farmer to be able to decide what method might fit his farm.

In what type of soil will hardground listing save labor in corn growing without decreasing the yields too much?

Pointing on a map to a strip of land about two counties wide along the western side of Iowa, Browning said it was "probable" that more listing in that area would save labor without other bad results.

"Not favorable for listing," the soil man said when asked about the Clarion and Webster soils of north-central Iowa.

The southern Iowa grass country was also listed as not favorable for an increase in listing. Eastern Iowa was said to have "possibilities" on some particular soils.

Norton pointed out that legume sod land can be listed as well as land in beans or corn the year before. The eight fields used in the experiment included sod and stalk ground.

Where is disking as a means of preparing the seed-bed for corn considered to have practical labor-saving possibilities?

Disking as a method for preparing the seed-bed for corn was thought to have the greatest possibilities for use on soils like the Clarion and Webster soils of central and northern Iowa, according to Browning.

Many farmers in this region have used disking to prepare the seed-bed for corn following soybeans. Some have tried disking on stalk ground with fair success.

Land must be disked several times to make a seed-bed for corn, Norton said. On sod land, the extra diskings necessary would probably prevent any saving of labor by that method.

What is sub-surface tillage, and in what soils is it probable that this method can be used to prepare the seed-bed for corn?

A sub-surface tillage implement cuts the furrow slice loose at about plow depth, shakes the soil up a little and drops it down the same side up.

Norton explained that the

labor saving by this method is due to the fact that a two-plow tractor will pull a sub-surface tillage implement cutting seven feet, as compared with 28 or 32 inches cut by the plow.

Sub-surface tillage is in the experimental stage. It may have possibilities for almost any type of soil. Experiments at the Nebraska station look good for sub-surface tillage.

"There may also be possibilities in combinations of these methods," observed Browning. Disking with sub-surface tillage, or sub-surface tillage followed by listing, might prove to be good for making a seed-bed.

Is weed control more difficult with the new tillage methods for making the seed-bed for corn?

Weed control was reported by Browning as being most easily accomplished in listed corn. Plowed land was second in ease of weed control. Sub-surface tilled land was third, and the disked land was most difficult for weed control.

Reasons for difficulty in weed control on the disked and sub-surface tilled land were (1) interference with cultivation due to the surface trash, and (2) the fact that weed seed is left on top of the ground.

Will the new methods of making the seed-bed for corn cause more or less soil loss?

Soil loss with three of the methods was measured at the Page county, Iowa, experimental farm in 1943. In that season, there was 10 inches of rain in June.

The tanks at the experimental farm caught 34 tons of soil per acre on the plowed and surface planted land; nine tons per acre on the sub-surface tilled land, and two tons per acre on land that was listed. All fields were planted on the contour.

Why are corn yields lower with the labor-saving methods, and why did fertilizer show up so well?

"It looks as if the plow does something to the soil," said W. H. Pierre, head of the agronomy department at Iowa State College, pointing to the yield differences in the experiment, and the greater effect of fertilizer on unplowed fields.

"It's probable," the agronomist said, "that turning the soil with the moldboard plow makes more plant food available thru aeration and bacterial action." He explained that the production of nitrogen thru decomposition might thus be stimulated.

"But this is only a one-year experiment," Pierre pointed out. He indicated it was impossible to say yet whether the obvious saving of labor could be justified by the yields.

Self-Service for Calves

To determine the relative effectiveness of the calves' nursing as compared to pail-feeding their milk during the period from birth to a uniform weaning weight of 500 pounds, the Bureau of Animal Industry last year raised nine Milking Shorthorn steers at its Beltsville, Maryland, station by the former method and compared the results with those obtained with 98 similar calves that had gone thru the record of performance test there under a system of pail-feeding milk up to weaning weights of 500 pounds.

The steers that nursed made average daily gains of 2.03 pounds from birth to weaning, while those that had been pail-fed during this period averaged but 1.77 pounds of gain per day. Furthermore, the nursing calves reached 500 pounds weight in 35 days less time.

The advantage secured by the nursing calves during their early life was carried on thru the fattening period to the final slaughter weight of 900 pounds. During the fattening period, the calves that had nursed to weaning gained an average of 1.96 pounds per day, as against 1.58 pounds per day for the steers that had been hand-fed. As a result they required 43 days less time on feed to reach final slaughter weight than did the steers that had been hand-fed during the earlier period.

It is significant, too, that the advantages of nursing carried thru to the final product. The steers that had nursed produced carcasses that graded approximately two-thirds of a grade higher than did the carcasses of the hand-fed steers. In fact, five of the nine steers produced carcasses that graded as high as good, while the carcasses of all steers that were hand-fed graded average medium. The steers that had nursed dressed 61.88 percent of their live weight as compared with 57.70 for the hand-fed steers.

In another phase of the test, heifers that were allowed to nurse did not show so great an advantage of nursing over hand-feeding as did the steer calves, but the trend was in the same direction.

In addition to saving considerable labor in raising Milking Shorthorn calves by allowing one or more calves to nurse a cow, the results obtained in this test indicate that there is a saving in feed and that a better-quality carcass can be produced from steers allowed to nurse instead of being pail-fed.—T. H., Md.

—*Successful Farming*

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

A Living from Bees — By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. (1943). $2.00.

America's Garden Book — By Louise Bush-Brown and James Bush-Brown. Charles Scribner's Sons (1939). $3.50.

An Agricultural Testament—By Sir Albert Howard, C.I.E., M.A., former Director, Institute of Plant Industry, Indore. Oxford University Press. $3.50.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State Coll., Univ. of Minn., Mont. State Univ. College Book Company. $3.75.

Dairy Cattle Feeding and Management — Third Edition — By H. O. Henderson, Professor of Dairy Husbandry, West Virginia University. 1st Edition by Carl W. Larson, Pres. Bryant & Chapman Co., and Fred S. Putney, late Professor of Experimental Dairy Husbandry, Penn. State College.
Publishers: John Wiley & Sons, Inc. (3rd Printing July, 1944).
557 pages. $4.00.

Dairy Science — By W. E. Petersen, Ph.D., Assoc. Prof. and Assoc. Dairy Husbandryman, Univ. of Minn. Edited by R. W. Gregory. J. B. Lippincott Company (1939). $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D.V.M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition (1943). $3.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing — By V. B. Hart, M. C. Bond, L. C. Cunningham, all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Farm Records — By John A. Hopkins, Ph.D., Asso. Prof. of Economics, Iowa State College. Iowa State College Press. $2.50.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Growing Tree and Small Fruits—By H. B. Knapp, Director, State Institute of Applied Agriculture, Farmingdale, Long Island, N. Y., and E. C. Auchter, Chief, Bureau of Plant Industry, U. S. D. A. John Wiley & Sons. $2.75.

Grow Your Own Fruit—By M. G. Kains, formerly with U. S. Dept. of Agriculture; Professor of Horticulture, Pennsylvania State College. Charles Scribner's Sons. $3.50.

How to Raise Rabbits for Food and Fur — By Frank G. Ashbrook, Fish and Wildlife Service, U. S. Dept. of the Interior. Orange Judd Publishing Co., Inc. (1943). $2.00.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Livestock Judging Handbook — By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Modern Agricultural Mathematics — By Maurice Nadler, B.S., A.M. Dept. of Mathematics, Newtown High School, Long Island. Orange Judd Publishing Co., Inc. (1942). $2.00.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox, Ph.D., Agricultural Writer, formerly with U. S. Dept. of Agriculture. Orange Judd Publishing Co., Inc. (1944). $4.50.

Natural Principles of Land Use—By Edward H. Graham,, Chief of the Biology Division of the Soil Conservation Service. Oxford University Press. 275 pages. $3.50.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Practical Farming for the South — By Benjamin F. Bullock, now Prof. of Rural Education, Atlanta University, Atlanta, Georgia. Univ. of North Carolina Press. $2.50.

Profitable Poultry Keeping — By H. Clyde Knandel, Prof. and Head, Dept. of Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue University. The Interstate Printers & Publishers. $1.80.

Roots in the Earth—The Small Farmer Looks Ahead — By P. Alston Waring and Walter Magnes Teller. Harper & Bros. $2.50.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

Successful Poultry Management — By Morley A. Jull, Professor and Head of Poultry Dept., University of Maryland. McGraw-Hill Book Company. $3.00.

The American Land—Its History and Its Uses — By William R. Van Dersal, biologist in the United States Department of Agriculture. Oxford University Press. $3.75.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

INDEX

Beef Cattle

Mexico's Cattle Industry.....Aug.-Sept., 1944
Pink Eye .....Aug.-Sept., 1944
What Type of Feeding Will Pay?..Oct., 1944
Performance or Show Ring Qualities Nov., 1944
Cattle in the Pines .....Nov., 1944
More Beef from Fewer Cattle .....Nov., 1944
Beef Cattle Do Better on Silage....Dec., 1944
Size Is Important .....Dec., 1944
Coarse Roughage for Cattle.....Jan., 1945
Grass Fed Steers Make Most Money..Jan., 1945
Cattle Like "Suiter's Grass".....Feb., 1945
Finish Young Steers with Grass and Grain, Feb., 1945
The Story of Meat .....Feb., 1945
Need of Efficiency .....Mar., 1945
Dark Beef .....April, 1945
What is Type? .....April, 1945
Breeding of Charollais Cattle .....April, 1945
Bang's Disease Control .....April, 1945

Conservation

Rebuilding Eroded Soil is a Slow Process, Aug.-Sept., 1944
Water Spreading on Range Land...Oct., 1944
It's Producing War Food and Feed..Oct., 1944
Man with a Bull-Tongue Scooter...Nov., 1944
Taking Our Soils for Granted.....Nov., 1944
Soils Take a Rest.....Dec., 1944
Undercover Farming .....Dec., 1944
From Poverty Grass to Alfalfa.....Jan., 1945
Didn't Plow Sod Land .....Jan., 1945
Sods for Soil Improvement .....Feb., 1945
Terracing for Fun .....Feb., 1945
Reed Canary Grass in Gully Control..Feb., 1945
Equipment Adapted to Contour Farming, Feb., 1945
Your Land Belongs to Tomorrow...Mar., 1945
Take Care of the Range and the Profits Take Care of Themselves.....April, 1945

Crops

Care and Feeding of Ladino.....Oct., 1944
Grass Seed Fortunes for the Harvesting, Oct., 1944
The Caley Pea—Sensation in the Deep South .....Nov., 1944
The Gamble Is Out of Brome.....Nov., 1944
Home Grown Clover Seed.....Nov., 1944
Our "Chinese" Food (Rice).....Nov., 1944
Hubam Clover a Four-Way Crop...Dec., 1944
What's New in Alfalfa.....Dec., 1944
Undercover Farming .....Dec., 1944
Hoeing Cotton with Fire .....Jan., 1945
Guar, Summer Growing Legume in Arizona, Jan., 1945
Didn't Plow Sod Land .....Jan., 1945
Sweet Potato Culture .....Feb., 1945
Sprouted Soybeans Save Feed.....Feb., 1945
Ladino Clover .....Mar., 1945
Giant Blue Panic Grass.....Mar., 1945
Blue Lupine, a Valuable Legume...Mar., 1945

Dairy Cattle

Fill Silo with Grass .....July, 1944
Feeding, Breeding and Management Studies, July, 1944
They Know Their Cows.....Aug.-Sept., 194
Herd Bull Management.....Aug.-Sept., 194
Water for Dairy Cows .....Aug.-Sept., 194
Good Feeding for Efficient Performance, July, 194
What Is a Good Herd Average?....Oct., 194
Injuries That Cause Udder Troubles Dec., 194
Cows Can't Synthesize Minerals ...Dec., 194
Control of Lice on Cattle.....Dec., 194
How Cattle Digest Their Feed.....Dec., 194
Shall I Inbreed?.....Jan., 194
Herd Replacements .....Jan., 194
Ration Book for Cows .....Jan., 194
Building a Disease-Free Herd.....Jan., 194
Nutritional Control of Milk Fever ..Feb., 194
Calf Pills—A New Feed .....Feb., 194
Feeding Moldy Silage .....Mar., 194
Pastures and Roughage.....Mar., 194
To Strip or Not to Strip.....Mar., 194
Urea as a Substtiute for Protein...Mar., 194
Winter Dysentery Penalizes Milk Production Mar., 194
The Triangle of Animal Life.....April, 19
Dry Dock for Cows .....April, 19
Bang's Disease Control .....April, 19
How to Select a Sire .....April, 19
Research in Dairy Husbandry at Ithaca, April, 19

Farm Machinery

Time to Think About Buck Rakes..June, 19
Rental Charges for Machinery.....July, 19
Substitutes for Dairy Help ..Aug.-Sept., 19
The Self-Propelled Combine .....Oct., 19
Electric Fence—Convenience or Hazard, Oct., 19
Electricity Unloads the Corn Wagon..Nov., 19
Care of Milking Machines.....Feb., 19
A "Sure Enough" Push Button Barn Cleaner Mar., 19
New Land Clearing Machine.....Mar., 19
Machine Co-op .....April, 19
Protects Metal from Rust .....April, 19

Fruit

Thinning Blossoms with Caustic Spray, June, 19
Magnesium for Apple Trees.....July, 19
Boom in the Tung Belt.....Aug.-Sept., 19
The Farmer Must "Mobilize" the Soil, Mar., 19
Pole Thinning of Peaches.....Nov., 19
Florida Has First Lychee Orchard..Dec., 19
Speed Sprayer Is Labor Saver.....Dec., 19
Reducing Apple Drop with Harvest Sprays, Jan., 19
Controlling Field Mice in Orchards..Jan., 19
New Varieties of Small Fruits .....Feb., 19
Methods of Speeding Apple Picking..Feb., 19

Fertilizers

Finer, Better Lime.....July, 19
Doubling Production by Bettering Soils, July, 19
Humus Carries the Ball.....Aug.-Sept., 19
Improved Fertility Saves Water, Aug.-Sept., 19
Fertilizing To Make Water Go Further, Oct., 1
The Precious Things of the Earth..Oct., 1
Secrets of Soil Organisms.....Oct., 1
Mightier Than the Mower.....Oct., 1

INDEX

Deep vs. Shallow Tillage ..... Nov., 1944
Soils Take a Rest ..... Dec., 1944
Fertilizing for Big Yields ..... Dec., 1944
Danger in Improper Use of Fertilizers, Jan., 1945
Soil Fertility, Food Source ..... Feb., 1945
Humus, Working Partner of Plant Food, Feb., 1945
Cornstalks to the Rescue ..... Mar., 1945
Fertilizer Makes Farm Acre Larger . Mar., 1945
How Long Do Effects from Fertilizers Last, April, 1945
Farm Manure as a Fertilizer ..... April, 1945

ay

Hay Mixtures Surpass Unmixed Crop Feb., 1944
Forced Ventilation Method of Curing Hay, May, 1944
Beating a Hay Shortage ..... June, 1944
Mow Curing of Hay ..... June, 1944
Curing Hay on Tripods ..... Aug.-Sept., 1944
Hubam Clover a Four-Way Crop ... Dec., 1944

ogs

Swine Tuberculosis Traced to Poultry, June, 1944
What Kind of Hog is Best? ..... July, 1944
Plant Proteins for Pigs on Pasture . July, 1944
Hybrid Pigs ..... Aug.-Sept., 1944
Swine Project Speeds Improvement . Oct., 1944
The ABC's of Sanitation ..... Dec., 1944
The Post-War Pig ..... Dec., 1944
Is Self-Feeding of Brood Sows Possible, Dec., 1944
More Pork at Less Cost ..... Jan., 1945
Conditioning Bred Sows Sensibly ... Feb., 1945
Hogs, Artichokes and Power ..... Feb., 1945
More Meat—Less Lard on the Post-War Hog, Mar., 1945
Rye Pasture for Pigs ..... Mar., 1945
Breeding for Efficient Gains ..... Mar., 1945
Round Worms of Swine ..... April, 1945
Feet and Legs ..... April, 1945

orses

The Horse and the Law ..... Aug.-Sept., 1944
"Alkali Reserve" and Staying Power in Horses ..... Nov., 1944
Columbus Took a Chance ..... Dec., 1944
What Kind of Horses Do We Need? Feb., 1945

stures

Better Pastures Depend on Soil Fertility,
Good Pasture Means Greater Income, Aug.-Sept., 1944
Pasture Poisoning ..... Oct., 1944
Green Pastures ..... Oct., 1944
Coarse Roughage for Cattle ..... Jan., 1945
New Pasture from Rock ..... Jan., 1945
Cattle Like "Suiter's Grass" ..... Feb., 1945
Good Pasture Management ..... Feb., 1945
Pasture with a Punch ..... Mar., 1945
To Expand the Roughage Supply .. April, 1945

ultry

What To Do About Blackhead ..... July, 1944
Ideal One-Man Poultry Plant . Aug.-Sept., 1944
Facts About Vaccinating Poultry, Aug.-Sept., 1944
Pigeons for Profit ..... July, 1944
Feeding Tricks ..... Oct., 1944
Efficiency Solves His Labor Problems Oct., 1944
He Knew What He Was Doing ..... Oct., 1944
Lime Those Poultry Droppings ... Nov., 1944
Daughters Are a Key to Progeny Testing, Oct., 1944
Three Ways to Figure Flock Averages, Nov., 1944
A Simplified Breeding Program .... Dec., 1944
Pigeon Heroes ..... Dec., 1944
5,000 Turkeys on One Acre ..... Dec., 1944
Which Range System? ..... Jan., 1945
Handling Poultry Manure ..... Jan., 1945
Improved Broiler Feathering ..... Feb., 1945
All Pullet Flocks May Be Post-War Necessity, Mar., 1945
Dressed Poultry ..... Mar., 1945
Early Hatching Pullets Pay ..... Mar., 1945
Spotlight on Vitamin D ..... Mar., 1945
Fiber and Bulk in Poultry Rations .. Mar., 1945
Prevent Cannibalism with Manure .. Mar., 1945
Meet the Situation ..... April, 1945
The "Why and How" of Crossbreeding, April, 1945
One-Man Poultry Farm ..... April, 1945

Sheep

Sulfur Treatment for Cocc. in Lambs, July, 1944
Science Remodels Sheep ..... Aug.-Sept., 1944
Fitting Sheep for Sales ..... Nov., 1944
Grainless Lamb Production ..... Nov., 1944
Sheep Pregnancy Disease ..... Nov., 1944
What is a Ram? ..... Dec., 1944
Some Facts About Feeding ..... Jan., 1945
Raising Sheep on Poor Feed ..... Feb., 1945
Pheno-Thiazine Salt Mixture ..... April, 1945
Good Sheep Don't Die in Debt ..... April, 1945

Forestry

White Pine Protected from Disease . July, 1944
Chemistry on a Sawdust Trail ..... Nov., 1944

Weeds

Nebraska's War on Weeds ..... July, 1944
Beat the Weeds for More Bushels, Aug.-Sept., 1944
"2-4-D," the New Weed Killer ..... Mar., 1945
Stop, Look and Question! ..... Mar., 1945

Vegetables

Mulch and Hill ..... June, 1944
Root-Knot Can Be Controlled ..... Nov., 1944
Custom Potato Spraying ..... Dec., 1944
Fertilizing for Big Yields ..... Dec., 1944

Miscellaneous

Penicillin Production and Agriculture, Jan., 1945
Observations on Agriculture in Iran . Jan., 1945
Ice Well Satisfactory ..... Jan., 1945
Experiment Station Goes to Farm .. Jan., 1945
Soldiers Wield Both Sword and Plowshare, Jan., 1945
Give 'Em Air (Barn Ventilation) ... Jan., 1945
Tenant-Purchase Program ..... Feb., 1945
160 Square Rods ..... Feb., 1945
Tomorrow's Farm at Today's Prices . Feb., 1945
Which Farm Lease Shall I Use? ... Mar., 1945
Urea as a Substitute for Protein ... Mar., 1945
How to Start a Car in Cold Weather . Mar., 1945
Earthworm Culture ..... Mar., 1945
Firesafe, Labor-saving Livestock Compound, April, 1945
Why Control Prices? ..... April, 1945
Hints for Trapping Muskrats ..... April, 1945
Meet Sporovibrio desulfuricans .... April, 1945
Electric Wire Fence ..... April, 1945

SOIL CONSERVATION BULLETINS

Soil Erosion a National Menace—Circular 33—25c

What is Soil Erosion—Misc. Publication—15c

To Hold This Soil—Misc. Pub. 821—45c

The Land in Flood Control—Misc. Pub. 331—10c

Conservation Farming Practices and Flood Control—Misc. Pub. 253—10c

Influences of Vegetation and Watershed Treatments on Runoff, Silting and Stream Flow—Misc. Pub. 397—15c

Soil Depleting, Soil Conserving and Soil Building Crops—Leaflet 165—5c

Cover Crops for Soil Conservation — Farmers Bulletin 1758—5c

Strip Cropping for Soil Conservation — Farmers Bulletin 1776—5c

Terracing for Soil and Water Conservation—Farmers Bulletin 1789—10c

Prevention and Control of Gullies — Farmers Bulletin 1813—10c

Terrace Outlets and Farm Drainageways—Farmers Bulletin 1814—10c

Erosion on Roads and Adjacent Lands—Leaflet 164—5c

Soil Conservation Districts for Erosion Control—Misc. Pub. 293—10c

Working Plans for Permanent Farms—Misc. Pub. 411—15c

Soil Conservation Survey Handbook—Misc. Pub. 352—20c

A Method of Estimating the Economic Effects of Planned Conservation on an Individual Farm — Misc. Pub. 463—10c

Soils and Men — 1938 Yearbook of the United States Department of Agriculture—$1.75

Any of the above literature may be purchased by name and number directly from the Superintendent of Documents, Washington, D.C.

ARE YOU KEEPING UP—

Keep up with the latest developments in your field? Here's a group of magazines that specialize in a particular subject! You'll be interested in at least one of these magazines . . . and you have the assurance that the articles are written by people who know. Send in your subscriptions today!

Farming

	Per Year
Farmer's Digest, monthly	$2.00
The Country Book, quarterly	1.00
Market (Truck) Growers Journal	1.00

Horses

Rider & Driver, monthly, horses for sport and pleasure	2.50
The Horse, bi-monthly	5.00
Thoroughbred (Horse) Record, weekly	4.00
Spokesman and Harness World, monthly	1.00

Bee Magazines

Beekeeper's Item	1.00
American Bee Journal	1.00

Livestock

Berkshire (Hog) News, monthly	1.00
Chester White World, m.	1.00
American Cattle Producer	1.00
Southeastern Cattleman	1.00
Coastal Cattleman, monthly	1.00
Pacific Stockman, monthly	1.00
The Sheepman	1.00
Arizona Stockman, monthly	1.50
Plantation Stockman, monthly	2.00

Pigeons

American Pigeon Journal, squab-fancy	1.50
Pigeon News, fancy only	1.50

Poultry

Progressive Poultryman, m.	1.00
Cackle & Crow, The Poultry-paper	1.00
Pacific Poultryman	.50
Northeastern Poultryman, 2 yrs., 24 issues	1.00

Rabbits

Calif. Rabbits Mag., m.	1.00
Calif. Rabbit News, m.	1.00
Intern. Comm. Rabbit Journal (Angoras only), m.	1.00
Small Stock (rabbits, cavies exclusively)	1.00
American Rabbit Journal	1.00

Fruit

Better Fruit, monthly	1.00
Eastern Fruit Grower	1.00

Dairying

Amer. Dairy Goat News, m.	1.00
Dairy Farmers Digest	1.00

Other Specialties

Co-operative Digest, m.	2.00
The Soybean Digest	1.50
New Agriculture (sugar beets only)	2.00
Small Commercial Animals and Fowls	.50
Modern Game Breeding, m., pheasant, wild waterfowl, etc.	3.00
Black Fox Magazine, monthly, fox, mink	2.00
Frontiers, natural history, 5 issues	1.00
Canary Journal, monthly	2.00
Natl. Amat. Minerologist, m.	2.00
Relics, m., for Hobbyists	1.00
Good Health, m.	1.00
Canary World, m.	1.25

All magazines are monthlies except where otherwise noted; prices are for one full year. Satisfaction guaranteed. All orders are handled promptly and acknowledged. Rush your subscriptions today. Remit in any manner convenient to you.

Magazine Mart

Dept. FD, P. O. Box 1288, Plant City, Fla.

Sample Copies at Single Copy Prices

Send for FREE Catalog